POPULAR INFORMATION

CONCERNING

INFECTIOUS DISEASES

BY

HORACE SWORDER

~~SH H~~

THE SANITARY INSTITUTE, INCORPORATED 1888.
SALUS GENERIS HUMANI.

IA|14

~~H6~~

Presented by

Thorne

1873

22101677743

The Sanitary Inst. Lib.

Med
K28763

POPULAR INFORMATION CONCERNING INFECTIOUS DISEASES

Digitized by the Internet Archive
in 2016

https://archive.org/details/b28063466

POPULAR INFORMATION

CONCERNING

INFECTIOUS DISEASES

BY

HORACE SWORDER
L.R.C.P. Lond., M.R.C.S.E., L.S.A.
MEDICAL OFFICER OF HEALTH TO THE BORO' OF LUTON (15 YEARS)
FELLOW OF THE BRITISH INSTITUTE OF PUBLIC HEALTH
LATE HOUSE SURGEON, HOUSE PHYSICIAN, AND
RESIDENT OBSTETRIC TO ST. MARY'S
HOSPITAL

HENRY RENSHAW
356 STRAND, LONDON
1893

Price 2s. 6d.

4 780 238

WELLCOME INSTITUTE
LIBRARY

Coll.	welMOmec
Call No.	WC

TO

WILLIAM HENRY BROADBENT

M.D., F.R.C.P. LOND.

PHYSICIAN IN ORDINARY TO H.R.H. THE PRINCE OF WALES

SENIOR PHYSICIAN TO ST. MARY'S HOSPITAL

CONSULTING PHYSICIAN TO THE LONDON FEVER HOSPITAL

This small volume is Dedicated

BY KIND PERMISSION,

AS A TOKEN OF ESTEEM AND GRATITUDE

BY THE AUTHOR

WHO ALSO WISHES TO EXPRESS HIS INDEBTEDNESS

TO

WILLIAM COLLINGRIDGE

M.A., M.D., LL.M. CANTAB., D.P.H.

MEDICAL OFFICER OF HEALTH TO THE PORT OF LONDON

FOR SO ABLY REVISING THE PROOF-SHEETS

PREFACE.

At a time when small-pox is making much headway, and cholera is threatening, I venture to introduce this little book to the notice of the public; in it the endeavour has been made to present information concerning infectious diseases in as interesting and forcible a manner as possible.

That the information is sound, the fact that the proof-sheets have been corrected by Dr. Collingridge, and inspected by Dr. Broadbent, is sufficient guarantee, and will, I hope, be so regarded by the public.

HORACE SWORDER.

LUTON,
March 10, 1893.

INTRODUCTION BY DR. COLLINGRIDGE.

THE almost incredible lack of knowledge of the elementary laws of infection, and the simple methods of endeavouring to combat them successfully, must be a matter of wonder to any one who has considered the question.

To a very large extent the spread of infectious disease is in the hands of the people, for it is by them that effective precautions must be taken, and by them only that their progress can be stayed.

Science can do, nay, has done, much to elucidate the causes of disease, and has laid down principles upon which our sanitary laws are based; it is to the public, after all, that one must trust for the due observance of these laws, not only in letter but also in spirit, and for the carrying out of these principles in their entirety. Much of this want of knowledge is undoubtedly due to the difficulty of obtaining the desired information in a simple and practical form. This little book is intended to supply this want. Starting with the assumption that every case of illness should be attended by a medical man, it does not touch upon the question of treatment, but in a clear and lucid manner explains only the causes and symptoms of preventable infections and the precautions which ought to be taken to prevent their spread. There are few on whom, at some time or other, the terrible consequences of neglect, carelessness, or ignorance in these matters have not fallen—there are none upon whom they may not at any moment.

This alone is ample justification for the issue of this work, which is sent forth in the hope that it may in some measure open the eyes of the people to the possibility of doing something to lighten the burden caused by the ravages of "preventable" disease.

W. C.

LONDON,
March 1893.

CONTENTS.

PART I.

PAGE
INTRODUCTORY 1
INFECTIOUS DISEASES . . . 4
THE PREVENTION OF INFECTION . . . 8
DISINFECTION 11
MEASLES 15
SCARLET FEVER 17
SMALL-POX 19
DIPHTHERIA 21
TYPHOID, OR ENTERIC FEVER . 23
TYPHUS FEVER 25
DIARRHŒA . . 27
CHOLERA 28
GERMAN MEASLES . . 30
WHOOPING COUGH . 30
MUMPS 31
CHICKEN-POX , ... 32
INFLUENZA . . . 32

PART II.

INTRODUCTION 35
MEASLES 37
SCARLET FEVER 38
SMALL-POX 40
DIPHTHERIA 48
TYPHOID FEVER . . 50
TYPHUS FEVER . . 55
DIARRHŒA 60
CHOLERA 62
TUBERCULOSIS 77

POPULAR INFORMATION CONCERNING INFECTIOUS DISEASES.

PART I.

INTRODUCTORY.

In writing this little book the author lays no claim to originality. As Medical Officer of Health for many years in a large town, he has had many opportunities of seeing what little interest the general public take in sanitary matters. It occurred to him that it was partly owing to there being no literature on the subject intended solely for them.

This book is divided into two parts: in the first part, the attempt has been made to interest the reader in the subject of "germs," some of the infectious diseases which owe their origin to them, and the manner in which war is made against them; in the second part, the invaluable reports of Sir John Simon, Dr. Thorne Thorne, and other able men have been largely drawn upon. These reports will enable the reader to have a clear and distinct understanding of the importance of the first part; will enable him to keep up with the times, and will give him a good idea of the nature of the work in which our great sanitarians are engaged.

This book is an honest attempt to popularise a subject which is of vital importance to everybody, and which, I believe, has not received due attention. This is no doubt largly owing to the difficulty which is experienced in writing on medical topics for the public—the difficulty of knowing what information to give and what to withhold.

I have very carefully endeavoured to err on the safe side, and, therefore, beyond nursing directions and Sir John Simon's personal precautions against cholera, I have stated nothing with regard to medical treatment.

These infectious diseases occur among all classes of society, and most of them fall with undue preponderance and severity upon the very poor; where the sanitary condition of a neighbourhood receives little or no attention, and these diseases are rife, the poor become a great source of danger to their richer neighbours who, in this way, are punished for their carelessness and neglect.

The saddest part about these diseases is, that the majority, possibly all of them, are preventible: and yet, in spite of our boasted civilisation, they still cause great havoc amongst us.

Strange though it appears, cholera saves in reality more lives than it destroys.

This is accounted for by the great terror which its name inspires, and the immediate attention paid to sanitary matters directly the alarm is given in any civilised community of the approach of the dreaded enemy. Sanitary defects are then remedied which may have been totally disregarded for years, and the outcome of it all is, that this wholesale setting of the house in order results in a few years in the saving of more lives than one or two severe epidemics of cholera would have destroyed. Typhoid fever is always present in our large towns and in those abroad, and is responsible for a large mortality. It is introduced into the body in the same manner as cholera, and arises from the same sanitary defects, though from a different poison. It is most probable, too, that diarrhœa, from which the mortality is greater still, is also frequently caused by the same filth-conditions which induce "typhoid"; so that the important sanitary steps which are taken to reduce cholera mortality continue to save life long after the cholera epidemic has been forgotten.

Cholera epidemics fortunately occur usually only after intervals of many years, whereas typhoid fever and diarrhœa flourish at all times.

It is a great mistake for people to argue as if every child must of necessity have scarlet fever, measles, etc. This belief tends to great carelessness and recklessness, and to what, in many cases, appears to be criminal neglect. If this belief were true, it would simply be because so few people trouble to falsify it. In fact, when the fire is kindled they do their best to add fuel to it by their carelessness or selfishness. If, however, the fault does not lie with them, it possibly does with their representatives forming the sanitary authority, who have failed in their duty—to the poor especially—by not protecting them by the adoption of the Act for the immediate notification of Infectious Diseases, or, if they have accepted it, have failed to provide any hospital accommodation for fever cases.

It is a well-known fact that in manufacturing towns work is often done in houses where some of the inmates are suffering from infectious diseases. It is consoling to reflect that sanitary reform, which could hardly be said to exist at the time of the first great cholera epidemic, is now advancing by leaps and bounds. And it must continue to do so, partly because of the better education of the people, who are more readily able to appreciate these reforms; partly because, owing to the rapid communication between all parts of the world, we are exposed to dangers before unknown, and against them self-defence is a vital necessity; partly because of the rapidity with which news is transmitted, and the attention of the public drawn by the Press to all that is sensational in disease and harrowing to the feelings; lastly, but not least, to the ever-increasing labours of a band of sanitary reformers, with which this land of ours is blessed. These reformers, like the Crusaders of old, make a religious war—not, however, against their fellow-creatures, but against the agents of disease, so often the harbingers of death.

Many of these diseases in their most malignant forms nearly always end fatally, no medicine being of any service. A disease like consumption, when once well established. ends sooner or later in death, whatever the treatment adopted. Here the sanitarian steps in and tells us that though certain diseases cannot be cured, yet they may most undoubtedly be prevented by the strict observance of sanitary laws, and that the old saying "prevention is better than cure," here receives its fittest application.

The reader will, I hope, if he read this book aright, be prepared to believe me when I tell him that preventive medicine is one of the noblest works in which a man can be engaged; and that our sanitary reformers. with the eye of faith, and with the utmost confidence. look forward to a future in which the grandest results will be achieved.

INFECTIOUS DISEASES.

The great importance of these diseases is derived from the fact that they can be communicated from one person to another; they are therefore commonly called "catching." It also seems highly probable that they can be communicated from animals to men, and *vice versâ*. The terms "contagion" and "infection" are often used to express the manner in which the communication takes place, whether by direct contact or otherwise; but as they are very frequently used indiscriminately, I shall always use the term "infection." It is stated that a fifth part of the annual mortality of the population of England is due to epidemics of these infectious diseases. We shall not, therefore, be accused of idle curiosity if we inquire as to the nature of the poisons which cause such great annual loss. It is now firmly believed that these poisons are manifold; that they are microscopic living particles, able to live both within and without the body and to multiply their kind; that they are among the lowest forms of organic life, and that they form a link between the animal and the vegetable world.

Further research may considerably modify our opinion on this subject; but acting on this supposition—viz., the existence of a living "germ"—surgical practice has been quite revolutionised. It was assumed that the cause of surgical infective diseases, and much of the mischief arising after operations, was due to living poisonous germs; means were taken, by perfect cleanliness, antiseptic dressings, and free ventilation, to combat these germs. The most successful and brilliant results followed this application of theory to practice. In whatever way the poisonous germs obtain access to the human body, whether through the air, the water, or by direct contact, they do not immediately produce their peculiar symptoms: there is a stage of latency or so-called incubation, which varies greatly according to the special disease. During this stage the poison grows and multiplies, and when this uniformly advancing process has accumulated in the body a certain amount of poison, general derangement of the system becomes apparent, and the stage of invasion begins. In this stage the body becomes feverish, and special symptoms arise, according to the nature of the poisonous germs. After a time, varying from one day in scarlet fever to perhaps ten in typhoid fever, a rash appears on the skin; later on, by some means or other, the disease comes to an end, either by the poison being thrown out of the system, by its failing to find sufficient food to live upon, or possibly by its producing some new poison which terminates its own existence.

In whatever way this happens, as a rule the human body is rendered fever-proof to this particular form of infection for years or for life, or as Sir John Simon expressed it, "all present, perhaps all future susceptibility, to the particular contagion is utterly exhausted from the patient, so that re-introduction of the same contagion will no more renew that patient's disease than yeast will excite a new alcoholic fermentation in any previously well-fermented bread or wine." The smallest particle of infections matter may suffice to produce disease in a susceptible person; but to such an extent does the poison increase and multiply in the human body that this one person may be the means of infecting an army. A most interesting question here arises as to whether these poisons are specific; in other words, do they always produce the same disease and no other—do they breed true? Sir John Simon says: "Each of these diseases propagates itself in its own form in as exact identity as if it were a species in zoology or botany; and in each such repetition of the disease there is a multiplication—always a large, and sometimes an inconceivably immense multiplication — of material which has the same infective property."

It is an undoubted fact that the poison of scarlet fever. whatever its nature, can only produce other cases of scarlet fever; that small-pox and measles can only reproduce themselves; and this is probably the case with all diseases of this class. Typhoid fever and diphtheria have doubtless their own specific poisons; but this has not yet been quite satisfactorily proved. The subject is surrounded with difficulties, for these diseases may be specific when they do not appear to be so; for infective matter has the power of lying dormant for long periods in furniture, etc., or in articles of clothing which possibly have been long shut up in drawers, and have escaped disinfection. If infectious disease occurred in this way, the presumption would probably be that it had originated independently of any previous case of the same kind, and quite erroneously. Under the heading of each separate infectious disease will be detailed the mode in which infection is supposed to enter and leave the body, and the special steps that should be taken to render it as harmless as possible; in other words, to prevent the spread of infection. These general directions will be found in a separate section.

Fortunately for frail humanity, there are means, natural and otherwise, of destroying these invisible germs, which would, I believe, be much more resolutely attacked if their existence were obvious to everybody: what, however, may be patent to everybody—even to the most sceptical—is some one or other of those filth conditions upon which the growth and development of these infectious living germs depends.

The germ theory has, however, as I have before stated, to be thanked for a wonderful improvement in our hospitals—for better ventilation, the allowance of more cubic space per patient, greater cleanliness, improved surgical dressings, and the practical outcome—a greatly lessened mortality.

All the sanitary efforts combined have largely decreased the number and intensity of epidemics, have had their share in lowering the death-rate, and have tended somewhat to alleviate human misery; for it is difficult to calculate the amount of trouble, suffering, and expense which a severe epidemic entails upon the community at large.

THE PREVENTION OF INFECTION.

We will suppose that the first case of an infectious disease has occurred in a small cottage where the space is limited and where there are other children. The only useful course to pursue is to remove the patient to a Fever Hospital, and then to have disinfection thoroughly carried out under the directions of the Sanitary Inspector. If there is no hospital—and this is more often the case than not—the medical man in attendance must do the best he can under the circumstances; this really amounts to letting things take their course, for he is powerless in the matter. If we are dealing with a case of cholera or small-pox, all the occupants of the infected house could possibly be isolated in it and almost completely shut off from the outer world. The sanitary authority in this case would supply all the necessaries of life and allow compensation for loss of work, etc. The general public have such a wholesome dread of small-pox and cholera that they will sanction such precautionary measures being taken in their interests, and the unfortunate inmates stand in such dread of public indignation if they are the means of spreading these diseases that they will willingly submit to be thus treated. By such means infection may be confined to one or two houses. This may not be effectual in small-pox, as infection is conveyed some distance through the air, and in cholera it may fail if the sanitary arrangements are imperfect. A few isolated cases of small-pox have occurred in my sanitary district from time to time, but have been promptly suppressed by *vaccination*, *isolation*, and *disinfection*. Compensation has been made when demanded.

Three cases occurred a few years ago in three separate houses, but with the above steps promptly taken, there was no further outbreak.

We will now consider what ought to be done when a case of fever has occurred in a house large enough for proper isolation to be effected. The sick person must be removed to a large airy room at the top of the house, with a sheet kept moist with carbolic acid (1 to 20) hung outside the door: this, if not much good, suggests caution.

All unnecessary furniture must be removed, together with the carpet, bed-hangings, and all the contents of drawers; in fact the room must be as bare and empty as possible. The nurse only must be allowed to go into the sick-room. She should wear a cotton dress that will wash (this will not hold fever germs so readily as woollen material), and an apron which should be taken off before she leaves the sick-room, and always before doing this she should wash her hands in some disinfectant or use carbolic soap. She should carefully see to the ventilation of the room, plenty of air without draught being required: the windows should always be opened night and morning for a few minutes, even in cold weather, and constantly in warmer weather, avoiding all draughts. A good plan is to raise the lower frame of the window six inches and place a piece of wood the proper size beneath it: the air will enter, without draught, between the window frames. A fire should always be kept burning, as it brings a constant current of air into the room and up the chimney; it prevents the likelihood of infection passing into the house, and makes the air of the room more wholesome, and is very useful to burn useless articles that have been infected. The nurse should see that all the discharges from the patient are received into vessels containing disinfectants; but soft rag should be used for those from the nose and mouth, and should be at once burnt. The other discharges should be immediately emptied into the closet, which should be thoroughly well flushed with water, and afterwards with plenty of carbolic acid. If possible, no other person in the house should be allowed to use this closet. The sick person's food should be placed outside the door for the nurse to take in, and also all other requisites. Food should not be left in the room, nor should food which has been in the room be given to any one else. All vessels, spoons, etc., used in the sick-room should be placed in boiling water and some disinfectant added.

The clothes, bed-linen, etc., of the sick person should be put into a bath or tub with boiling water and carbolic acid; a greater precaution still would be to boil them, then they must be washed in the ordinary way at home. Children must be prevented from going near the sick-room; they must be kept from school and from playing with other children until it is considered safe, and the family should as far as possible avoid associating with others. Of course, whenever it can be done, those members of the family who have not been exposed to infection should be sent away: this great responsibility rests with the doctor in charge of the case.

No cat or dog must be allowed in the sick-room, as it might convey infection.

If the disease be small-pox, all the inmates of the house must be vaccinated or revaccinated, except in the case of young children who have recently undergone vaccination or have good marks.

All nuisances must be attended to and all filth accumulations should be removed. Drains must be flushed and disinfected; many of these infectious diseases are intensified by bad sanitary conditions. If the patient die, the body should be thoroughly wrapped up in a sheet wrung out of strong carbolic acid, placed in a coffin with one or two pounds of carbolic acid powder, and fastened down and buried with the least possible delay.

The body, unless removed to a mortuary, should be left in the sick-room until the funeral. which should be attended by as few people as possible.

When the case is over, whether it end fatally or otherwise, disinfection must be thoroughly carried out according to the directions given in the section on Disinfection. It must always be remembered that the spores—which are immature forms of the adult germs—are much more difficult to destroy than those which are fully developed.

The spores will resist extremes of temperature and drying which will destroy the fully developed germs. Possibly, the above directions cannot all be carried out in their entirety, but it is advisable to do everything that is practicable in each individual case.

This little book is in no way intended to interfere with the doctor's province; but it is a distinct gain to the doctor, who is often worked to an almost superhuman extent during the prevalence of an extensive epidemic, that the friends of the patient should have some knowledge of what they ought to do, and be prepared to do it.

In that case they are much less likely to work against their medical adviser or to disregard his wishes, as they understand the why and the wherefore, and can take an intelligent interest in outwitting and killing those unseen yet very real and redoubtable germs.

DISINFECTION.

When we use disinfectants, what do we expect them to do? It is essential for us to have a general idea; for, without this, we are apt to employ them in the most useless manner, treating them in fact more as charms than as potent factors in the destruction of those germs to the existence of which these infectious diseases are pretty generally considered to be due.

The germs of an infectious disease multiply to any extent in the bodies of the sick, who have the power of throwing the germs out of their bodies by the breath and skin, by the secretions and discharges, infecting the air of the room and everything in it.

That is, speaking generally, however; for some of these diseases throw off germs in one way and some in another, as will be hereafter shown.

Now we are ready to consider what agents are used to destroy, or render inert, the germs of any infectious disease. The greatest disinfectants are given us by Nature, and are *fresh air*, *water*, *heat*.

The importance of fresh air has been already alluded to when speaking about the ventilation of the sick-room. It tends to dilute the poison and make it less dangerous for the nurses, as well as being of the utmost importance to the patient; for, besides the germs, other matter, often very offensive, is given off in expiration.

Water is used as boiling water and in the form of steam. Steam is the most potent of all disfectants, and Dr. Parsons' experiments show that the germs of the ordinary infectious diseases of mankind are not likely to withstand an exposure of five minutes to boiling water or steam at 212° Fahr.

Steam penetrates into bulky and badly conducting articles such as mattresses, pillows, clothing, etc., far more rapidly than dry heat. The penetrative property of steam may be increased by employing it under pressure, or superheating it. Washington Lyon's steam disinfector is coming into great favour with sanitary authorities, the expense alone standing in the way.

Heat is also a most useful agent, and until recently was in most favour, being easily and not very expensively applied; but it is rapidly being superseded by steam.

Dr. Parsons in the above-mentioned experiments concluded that exposure to a dry heat of 220° F. would effect the same result as exposure for five minutes to boiling water or steam.

The use of steam and heat for purposes of disinfection cannot be carried out, however, at home, and not at all unless the sanitary authority of the place has provided the proper apparatus. Of course, boiling water is extremely useful as far as it can be applied; but, unfortunately, bedding, blankets, carpets, and woollen clothes will not bear this treatment. It will be noticed that in Dr. Parsons' experiments boiling for five minutes destroys all ordinary germs.

It is important that the public should thoroughly understand what is effective and what ineffective disinfection; they will then put pressure upon their sanitary authorities to provide them with a suitable public disinfector—if that pressure be required.

Now we come to the liquid disinfectants, whose name is legion, but very few of which are probably of any practical use to destroy the germs. Until recently, a large number have been recommended, but with our fuller knowledge their number has sadly dwindled. Corrosive sublimate and carbolic acid are the most potent.

Corrosive sublimate cannot be recommended in a popular book, for it is most poisonous, but very effectual in the proportion of 1 part to 1000, with a little free hydrochloric acid. It must be left to the medical man in charge of the patient to order this potent disinfectant and to urge the proper precautions.

Carbolic acid is very poisonous too, but it is not odourless and tasteless like corrosive sublimate. It ought always to be sold in fluted bottles to avoid mistakes, and should be used in 5 per cent. solutions (1 to 20). The necessity for caution is very great, as the crude acid has often given rise to fatal accidents through being mistaken for other liquids. In the above-mentioned strength, the acid is very useful for steeping clothing, for scrubbing floors, and for placing in the vessels which receive the excreta; it is also useful for pouring down closets, and for urinals, ash-heaps, etc. It is very destructive to low forms of life, and checks or prevents all putrefactive changes.

Carbolic acid is also very useful in the form of powder—carbolate of lime—and can be so used without danger.

We now come to a class of disinfectants called gaseous. They are extremely useful, but, unfortunately, in the light of greater knowledge, doubt is being thrown upon their power of destroying germs, or rather their spores (immature germs), in the effectual manner upon which we had confidently relied.

Three gases are sometimes generated for this purpose, but the only one to which I shall allude is that in common use—viz., sulphurous acid gas, generated by burning sulphur. This gas is very largely used for disinfecting empty rooms, but where the sanitary authority have provided no public disinfector, it has to disinfect nearly everything in the sick-room, including bed and bedding.

The following directions for disinfection are given by Dr. George Wilson in his "Handbook of Hygiene:" When the illness has terminated, the sick-room and its contents should be thoroughly fumigated and disinfected. This is best effected in the following manner:—Spread out and hang over lines, stretched across the room, all articles of clothing and bedding; stop up the chimney flue, and well close the windows and other openings; then take lumps of sulphur, well broken up (about one pound to every 1000 cubic feet of space), place them in an iron dish (or the lid of an iron saucepan), supported on a pair of tongs over a bucket of water, and set fire to the brimstone. The door should then be shut and all crevices stopped up, and the room kept closed for at least six hours. After fumigation, the room should be freely ventilated; the wall paper, if any, removed; the walls and ceiling lime-washed, and the floor and furniture washed with carbolic-acid soap and water. The bedding, mattresses, and articles which cannot well be washed, should be sent to a disinfecting chamber, wherever such chamber is provided by the sanitary authority. Failing this, all articles should be well traced out and fumigated in the sick-room; such of them as can be steeped in water should be steeped in a strong solution of carbolic acid, and all of them freely exposed to the air afterwards. Soiled bedding and mattresses, which cannot be properly disinfected, should be destroyed, or buried, with disinfectants thrown over them, in a hole dug in the garden."

It is satisfactory to know that the efficient action of the principal of these agents is no longer a matter of speculation: the subject has been worked out by carefully conducted experiments, and by these means the degree of concentration necessary to destroy these poisonous germs has been determined. These experiments have shown that many powerful deodorisers do not kill the germs unless highly concentrated; but that, without actually destroying them, they may check their growth.

It must be remembered that removing an offensive smell by some so-called disinfectant is not equivalent to destroying the cause upon which it depends, and so, by giving rise to false confidence, may be a very serious source of danger.

We have now learnt that true disinfectants must be powerful enough to kill germs and their spores; that they must be used thoroughly—that is, of sufficient strength and for a sufficient time; and that they must entirely permeate the articles requiring disinfection.

We now pass on to consider some of the infectious diseases separately.

MEASLES.

Measles is a specific infectious fever occurring in epidemics. It is characterised by a rash which appears on the fourth day after catarrhal symptoms. The infectious poison is contained in the breath and exhalations, and the disease is probably always acquired by inhalation.

Incubation.—The infection lies dormant in the system for a time varying from ten to fourteen days before the sneezing and other catarrhal symptoms appear.

Onset or Invasion—The onset is sudden and marked by chilliness, feverishness, sneezing, running from the eyes and nose. and a hard cough, followed by the rash on the fourth day.

The Rash is of a deep red colour, and slightly raised; the spots run together and form blotches of a crescent shape. They first appear on the forehead, face and neck; afterwards, all over the body, and may be followed by fine branny peeling.

Duration.—The catarrhal symptoms continue throughout the eruptive stage, which lasts usually about three or four days; if much longer, it is usually due to some chest complication.

There is a malignant form of measles which generally runs a rapidly fatal course.

Complications.—Diseases of the lungs and diarrhœa; more or less bronchitis nearly always accompanies measles. Enlargement of the glands of the neck, discharges from the ears, affections of the eyes, and consumption are apt to follow measles. In addition to these many other serious affections occasionally follow.

Quarantine.—The disease is highly infectious in the catarrhal and eruptive stages, more so before the rash appears than at any other time, but rapidly becomes less so. As cases, however, have occurred where infection has taken place as late as three weeks after the eruption, it is advisable, to be quite on the safe side, to isolate the patient for one month.

I am here stating only what is advisable, not what is ordinarily done or what is likely to be done; but there are many cases where it is, for one reason or another, all-important to prevent the slightest chance of further infection.

No convalescent from measles should be allowed to attend school under one month. If the other children have been sent away on the outbreak of the disease, they ought not to be considered safe for at least fourteen days, which is the ordinary time of incubation. It is always advisable, however, to allow a few days over the average time; this is to be taken to apply to all these diseases.

Nursing Directions.—The ordinary directions for fever cases are to be carefully observed. Attention, however, should particularly be drawn to the following:—The patient must from the earliest symptoms be kept isolated in one room, somewhat darkened if the light affects the eyes; the temperature of the room is to be constantly at 65°; the room is to be well ventilated, without draughts. It is advisable to keep the patient in bed for a day or two after the feverishness has disappeared; in one room for a week longer; and not to allow him to go out of doors for three or four weeks, depending upon the state of the weather, the season of the year, the susceptibility of the patient to take cold, and the presence or absence of complications; sea-side afterwards, as the effects on the health are often more serious than might be expected.

SCARLET FEVER.

Scarlet fever is a specific infectious fever characterised by redness of the throat and a finely diffused scarlet rash, followed by peeling of the skin, especially of the hands and feet, and sometimes by rheumatism and kidney disease. The disease usually occurs in epidemics every few years, though it is often endemic. The intimate cause of scarlet fever is a specific germ, which is always derived from a previous case of scarlet fever, unless it be derived occasionally from some analogous diseased condition occurring in cows.

Infection is derived from the breath, by discharge from the throat and nose, and, later on, from the scales thrown off by the skin.

Incubation.—The disease lies dormant for a variable time, usually three or four days, exceptionally, however, even less than twenty-four hours or as much as seven days.

Onset or Invasion.—This is sudden; the patient is generally sick, complains of headache and sore throat, and becomes very feverish. These symptoms continue for twenty-four hours when the rash appears.

The Rash consists of bright red spots, which afterward become diffuse and appear first about the neck and chest and then spread all over the body, fading away on the fourth to the sixth day of the disease.

Duration and Quarantine.—The disease is infectious from the commencement of the fever to the very end of the peeling, which is seldom over before the end of five weeks, and may continue two or three weeks longer; if any complications exist, such as discharges of any kind, or kidney disease, isolation may be necessary for a still longer time. In severe cases the throat trouble is very serious, there being ulceration or sloughing of the tonsils; in more severe cases still, called malignant, the patient dies from profound derangement of the nervous system.

The patient should not be allowed to go to school under six weeks at least. Any susceptible person who has come in contact with him must not be considered safe from taking the disease for at least nine or ten days.

Complications.—Glandular abscesses in the neck, convulsions, rheumatism, inflammatory heart affections, and joint diseases. Besides the above, which may occur early, kidney disease is apt to follow at or about the end of the third week; ear disease, glandular abscesses, inflammation of the lining membranes of the lungs and the heart may also occur.

Nursing Directions and Precautions.—The patient is to be isolated in a well-ventilated room with a temperature about 62°. Three weeks ought to be passed in bed, and a further two or three weeks in one room. The mild cases cause great concern: as the child is hardly ill, the parents do not see the necessity of keeping it in bed more than a few days, and the doctor either is not called in, or does not continue his attendance; the child is very likely to catch cold, and kidney disease and dropsy to supervene; in all probability, too, it is not strictly isolated, and therefore becomes a source of infection to others.

The worst cases, however, for spreading the disease are those extremely mild ones where the nature of the disease is hardly suspected. The child is allowed to return to school after perhaps a day or two at home, it therefore peels while attending school and, in this manner, spreads the fever far and wide. When the skin is peeling it should be rubbed with carbolic oil night and morning.

Under medical advice warm baths will have to be given when the peeling begins; plenty of carbolic soap and water, with friction, are useful to hasten the process. Of course great care must be taken to put the child back to bed warm, and to avoid exposure to draughts while in the bath.

SMALL-POX.

Small-pox is a specific infectious fever with a very characteristic eruption. It is a horribly disfiguring disease, and was formerly one of the most dreaded of scourges, owing to its great fatality, and to its marking its victims for life. It has been robbed largely of its terrors by the introduction of vaccination. Now that its past ravages are forgotten, it is fashionable to decry the preventive agent. Those who are efficiently protected by vaccination, if attacked by small-pox, usually have it in a very modified form and are not disfigured. The diffusion of infective matter occurs, to a vast amount probably, with all the exhalations from the body. The disease is highly infectious from the earliest period, but particularly when the scabs begin to separate.

Onset or Invasion usually begins suddenly, with severe shivering, vomiting, headache, pains in the loins, perspirations and feverishness. Sometimes before the distinctive rash appears the patient has one like that of measles or scarlet fever.

The Rash appears usually on the third day of the fever, with red pimples on the face, forehead and wrists, and gradually spreads over the body; the spots feel like shot under the skin; they enlarge, and in two or three days become like small blisters (vesicular), and are depressed in the centre. About the eighth day the clear fluid becomes turbid, owing to the vesicle becoming a pustule, the skin around the pustules becomes hot, red and swollen, the pustules gradually dry up into scabs, and these fall off about the third week; deep red spots are then left which ultimately leave depressed white scars. In some cases small blood spots appear under the skin, and in very severe cases much larger spots.

Duration.—The disease lasts a very variable time according to the form of it. In the mildest cases, which occur in those partly protected by vaccination, the patients are quickly well, the disease being cut short. In those who are totally unprotected by vaccination, the fever, which always greatly moderates after the rash appears, again becomes very severe in the pustular stage—this fever may last from three to six or eight days. It is in this particular stage that the efficacy of vaccination is so apparent, as this secondary fever, which often runs very high, occurs at a time when the patient has already been much exhausted. Those cases where the spots do not run together generally recover; half of those where they do so (confluent small-pox) die about the eleventh day. In the worst cases, commonly called malignant, death almost invariably occurs

Complications.—Abscesses, erysipelas, inflammation, or even destruction of the eye, ear disease, diseases of the lungs, blood-poisoning.

Quarantine.—The patient should be isolated for at least six weeks, and until the scales have entirely disappeared, *and not return to school* for that time. Any one exposed to infection should not be considered safe until about eighteen days after the last exposure to infection.

Nursing Directions.—If there be a fever hospital the patient should be at once removed to it, and the infected room, and everything in it, should be thoroughly disinfected with sulphur—unless there is a public disinfector to which all infected articles can be sent. Everything of small value should be burnt. If the patient has to be treated at home, all the general directions should be faithfully carried out. Whether the patient be removed or remain at home, everybody in the house should be vaccinated or re-vaccinated, unless this has been recently performed, or in the case of very young children with good vaccination marks. If treated at home, a good nurse must be secured. She must be re-vaccinated. Two nurses, however, are advisable, if possible, as, if the patient is delirious, he must not be left for a moment. The scabs should be treated with carbolic oil, as they are so highly infectious, and burnt as they fall off.

Disinfection must always in these cases be carried out under the superintendence of the inspector of nuisances.

DIPHTHERIA.

Diphtheria is an infectious disease probably due to a specific poison, often prevailing epidemically, but always present in some places. The essential characteristic of this disease is an inflammation of the mucous membrane of the throat, and often of neighbouring parts, with the formation of a greyish white membrane upon the inflamed surface. The breath and the discharges from the nose and mouth are infectious from the first, and possibly the excretions.

Incubation.—Probably from two to six days; there is great difference of opinion on this point.

Invasion.—Though an acute affection, it comes on gradually, with slight feverishness and a sore throat, upon which a greyish-white deposit is soon observed; the glands outside the throat enlarge and can always be felt on one or both sides. The patient rapidly becomes prostrate, partly due to the terrible weakness caused by the poisoned blood, and partly (in a much lesser degree) to the small amount of nourishment usually taken, owing to the great pain in swallowing.

Rash.—A rash is sometimes, but not very often, seen, and is in no ways characteristic.

Duration.—In favourable cases the disease runs its course in about eight to ten days; the membrane loosens and gradually comes away. In more severe cases death may occur from one to several days.

Quarantine.—The patient should be isolated for one month, and no child should be allowed to go to school from the infected house. No one who has been exposed to infection should be considered safe for about ten days.

Complications.—These are chiefly due to the extension of the disease to neighbouring parts. When it extends to the air passages (the larynx) croupy symptoms occur and often cause death from suffocation. Sometimes in these cases the introduction of a tube into the air passage below the obstruction saves life. Death often results from sudden failure of the heart's action, even in mild cases, and without any warning. Extension of the inflammation may give rise to death from bronchitis or inflammation of the lungs. Sometimes paralysis comes on, the first symptom of which is often inability to swallow, and the return of food through the nose.

Nursing Directions.—If the patient be not removed to a fever hospital all the ordinary directions are to be observed. The special precautions are for the nurse to wipe away all secretions from the nose and mouth with pieces of rag, which should be immediately burnt; she must avoid taking the patient's breath. A good, intelligent nurse is absolutely essential, as in consequence of the tendency to death from heart failure, the patient's strength must not be frittered away by bad handling and nursing. Besides, the complications which are so apt to occur, demand a skilled nurse, whether it be to keep up an equable temperature in the room, or an atmosphere of a sufficient degree of moisture, or to feed the patient with a tube, or by the bowel in case of inability to swallow, or to assist the surgeon during the operation of opening the air passage which may be required, and to carry out the after treatment which is most important. I have come to the conclusion that it is useless to open the air passage in these cases except in a hospital, or when one has the services of a trained nurse. One of the worst cases of bed-sores I ever saw occurred in an adult after diphtheria. It is assuming a terrible responsibility to undertake to nurse a case of diphtheria without some fair qualification for the post.

TYPHOID, OR ENTERIC FEVER.

Definition.—Typhoid fever is a specific feverish disease, infectious chiefly through the excretions. It is characterised by fever lasting usually about three weeks, and by a rash, and is usually attended by diarrhœa with characteristic motions. It is probably dependent upon a specific germ, though appearances are often against this supposition.

Incubation.—This varies, the average time is probably fourteen days, though it is said to be as short as five in some cases and as long as twenty-two in others. It is probable that when the time is very short, an extra amount of poison has been taken into the system.

Onset or Invasion is very insidious, the first symptoms being ordinarily only those of slight indisposition.

The Rash appears from the seventh to the tenth day on the chest and abdomen; it consists of a few rose-coloured spots which disappear for a moment on pressure: in a certain proportion of cases, however, they are absent.

Duration.—The disease usually lasts about three or four weeks, the critical time being about the end of the third week. Relapses, however, are very common, and may cause it to last from four to eight or ten weeks: it does not end by crisis, but the feverishness gradually declines.

Quarantine.—In ordinary cases the patient should be isolated for one month, but in severe cases with relapses this term may have to be greatly extended. Any one who has been exposed to the chances of infection (which, however, are very small indeed if proper precautions be taken) must not be considered safe for at least three weeks. When proper precautions are taken typhoid cases can be safely treated with other patients in the wards of a hospital.*

Complications.—Inflammation of the bowels (usually, but not always, due to ulceration) causing perforation of the bowel and allowing the contents of it to escape. More or less bronchitis generally accompanies the disease, ulceration of the larynx, inflammation or congestion of the lungs, bed-sores, and many other troublesome complaints.

Nursing Directions.—If the patient be not sent to a hospital, a thoroughly trained nurse should be procured. She will be in little danger herself if she uses all the ordinary precautions, and, in addition, is very careful to disinfect the stools and the soiled linen, &c. The most frequent mode of infection, it must be remembered, is through contaminated water, or milk, or possibly food, after contact with the unwashed hands of a nurse. There is no doubt, too, that the poison is also carried in the air from drains, cesspits and contaminated soil. In these cases the poison is probably swallowed. There is not the same danger to the nurse as in typhus, where a small area round the patient is most highly and dangerously infectious. She should be very careful about the temperature of the room if bronchitis accompany the disease; at the same time it must never be allowed to become stuffy. To avert the low form of pneumonia which is so frequent in severe cases, the same precautions as recommended in typhus must be taken with regard to position, and to avoid bed-sores. There is one other most important direction upon which the life of the patient depends—viz., to watch him narrowly that he does not manage to get any solid food before the doctor allows it, as it would probably cause perforation of the ulcerated bowel, which result usually ends in death; the patient gets very hungry and impatient and will resort to subterfuge to procure solid food.

---

* Dr. Broadbent.

TYPHUS FEVER.

Definition.—Typhus fever is a very infectious disease, characterised by a peculiar mulberry rash and very severe affection of the nervous system. It is doubtless due to a specific germ and is essentially a preventible disease. The only condition uniformly observed to give rise to outbreaks is over-crowding (Quain), but it is also generally associated with destitution.

Incubation.—This period is very uncertain, varying, it is said, from a few hours to three weeks or more, probably twelve to fourteen days is the most usual time.

Onset or Invasion may be gradual or sudden, and is accompanied by the usual symptoms of fever. By the end of the first week, the patient is very ill indeed; delirium sets in, and is either of a low kind or the patient may rave: the muscular weakness becomes extreme.

The Rash.—A mulberry rash appears at any time between the fourth and seventh day; it comes out on the abdomen and chest, and may spread elsewhere. Besides the rash there is also a dusky red mottling.

Duration.—The disease usually terminates in a crisis about the end of the second week, but death very often results about this time from heart failure, or congestion of lungs or brain. The third week may be considered that of convalescence; the patient is generally left remarkably weak.

Quarantine.—The patient must be isolated for one month, and any one who has come in contact with him must not be considered absolutely safe for three weeks, the incubation stage having occasionally been observed to last all this time.

Complications.—Pneumonia is the only one of common occurrence. Bed-sores must be carefully guarded against.

Nursing Directions.—Remove the patient to a hospital; if this be impossible, the ordinary directions must be most strictly carried out, especially as regards ventilation. The disease is most highly infectious in the more immediate neighbourhood of the patient, and is one of the most dangerous to doctors and nurses; they are entirely unprotected from its virulence, unless shielded by a previous attack; for, in typhus, unlike small-pox, there is no safeguard like vaccination. The infection is given off by the breath, and probably by exhalations from the skin. The tendency to pneumonia must be combatted by turning the patient occasionally to one side or the other, not allowing him always to lie on his back. Great attention must also be given to prevent bed-sores by keeping him thoroughly dry and clean, and applying spirit lotion night and morning to any portion of the skin showing signs of redness, and, if necessary, an air or water cushion should be procured. As in typhoid fever, and in the most severe cases of all these infectious diseases, a skilled nurse is indispensable. Even if the expense is a great tax on a modest purse, the expenditure, in nine cases out of ten, is real economy; when death occurs through the strength being frittered away by bad nursing, the false economy proves a constant source of reproach and regret to the survivors.

DIARRHŒA.

Diarrhœa occurs during the summer and autumn as an epidemic; looseness of the bowels, commonly called diarrhœa, is the prominent manifestation. It is classed among the zymotic diseases. The disease occurs regularly every year, and is very fatal to children. To whatever cause its origin may be attributed, a continued high atmospheric temperature, with *increased temperature of the soil*, is always apparently the principal factor which determines a large or a small epidemic. For many years, I have noted in my annual reports that, in very hot and dry summers, the infant mortality referred to diarrhœa was very high, and that in those summers with no long-continued heat, or in very wet ones, the mortality was comparatively trifling; my statistics for nearly fifteen years prove this. The why and the wherefore I did not know, but always believed that the primary element in its causation was milk which had become sour owing to the hot weather; and, quite a secondary one, the relaxing effect of excessive heat on children previously debilitated. It is important to note that children who are suckled are much less subject to diarrhœa; the majority of the cases are hand-fed, and suffer from rickets, debility or wasting, and thus they fall easy victims to the disease. The children of the poor suffer much more from diarrhœa than those of the rich, and, in my experience, furnish nearly all the fatal cases.

It has recently been explained why the mortality is affected by a high temperature, and I will refer the reader to the Second Part for further information on this highly interesting subject.

Diarrhœa lasts a variable time, but may be rapidly fatal from collapse, or possibly convulsions. It is always prudent to call in a doctor at once. In very mild cases, where this is not done, it is advisable to boil the milk and to see that the feeding bottle is thoroughly cleaned : a dirty bottle, by souring the milk, is a frequent cause of diarrhœa. Attention to these small matters and taking the child off milk for a few hours, or giving very small quantities at a time without warming it, may soon result in restoration to health.

If there is any known or suspected sanitary defect. the Medical Officer of Health should be consulted. Milk rapidly absorbs poisonous germs : those who know much of the homes of the very poor cannot be surprised at their milk supply being a source of danger to their children. and especially when it is remembered that the milk so often reaches them in a highly diluted condition, the water, with which dilution has been affected, not always itself being above suspicion. It is advisable to disinfect the motions with Condy's fluid or some other disinfectant.

CHOLERA.

Cholera is an acute disease which occurs epidemically in temperate climates, but is always present in India. The disease is characterised by constant vomiting and diarrhœa, which is at first bilious, afterwards like rice-water. Violent cramps occur in the extremities, the face becomes pinched.

blue and cadaverous, and the skin cold and livid; there is terrible thirst, the eyes are sunken, and the breath cold, the pulse feeble and imperceptible. From this state of collapse the patient may slowly recover or he may fall into a "typhoid" state.

The disease is doubtless due to a specific germ, but at present it has not been identified with certainty; though Koch's microbe, the comma bacillus, is nearly always present. The poison probably gains access into the body by inhalation or swallowing, and is given off in the discharges from the bowels and in the vomit; these may infect water, the soil, or bedclothes, &c.

Incubation is probably from two or three days to a week or two.

Invasion or Onset.—There may be premonitory symptoms of malaise or of diarrhœa for a few days, or the disease may set in suddenly.

Rash.—There is no rash; or, if one, not until the stage of reaction has set in.

Duration is most variable. The worst cases die in a few hours; other cases terminating fatally may last a week or two.

Nursing Directions.—If the patient be not removed to a hospital, a trained nurse should be procured at once. No directions can safely be given in a disease which tends to such a rapidly fatal termination, except that the nurse should carry out the doctor's instructions to the letter, and that before his arrival she should disinfect any vomit or motion with some powerful disinfectant, as any neglect on this head might have serious and very far reaching consequences. The comma bacillus is readily destroyed by heat or other disinfectants, or by mere drying (Koch).

For further information concerning this disease, which threatens to have a very painful interest for us later on, I would refer the reader to the Second Part.

GERMAN MEASLES.

German measles, also called "Rotheln," is an infectious disease which occurs in epidemics, and is characterised by a rash which sometimes resembles that of scarlet fever but more often that of measles. It begins on the face and thence extends to the body and limbs; it is usually accompanied by slight fever which subsides with the rash about the third day. The rash appears about twenty-four hours or less after the commencement of the fever; the disease is not preceded by catarrh as in measles, nor is it followed by peeling as in scarlet fever. The glands of the neck are usually enlarged on both sides. The stage of incubation lasts about fourteen days. Any one who has been exposed to the infection would not be absolutely safe for at least fourteen days. The patient should be isolated for two or three weeks, and should not be sent to school under about one month. If the nature of the disease is at all open to doubt in the first instance, the possibility of its being scarlet fever should be borne in mind and strict precautions taken.

WHOOPING COUGH.

Whooping cough is a specific infectious disease, occurring mostly in children, and followed, after a severe cold lasting seven or more days, by a characteristic cough which is spasmodic and ends in a whoop.

The infection is given off in the breath and expectoration, and is inhaled by others; in those who are susceptible, the poison settles in the air passages, where it multiplies, and in time produces the characteristic symptoms. The disease lasts a variable time, rarely less than a few weeks.

It often follows on measles; the poison of the two diseases, it is stated, often being received together. Like measles, whooping cough is an epidemic disease, and recurs at short but irregular intervals. The mortality is usually small, seldom exceeding 5 per cent. When death occurs it is nearly always due to chest affections or convulsions.

The incubation period is uncertain, probably from seven days to three weeks.

It is difficult to say how long the infection lasts; precautions ought to be taken for a week or so after the spasmodic cough has disappeared.

People of all ages may suffer from the disease, but it is much more common in young children and infants. Articles of clothing may convey the disease. Isolation ought to be carried out. The expectoration and vomited matter should be disinfected and, when the disease has terminated, the sick-room should be fumigated.

MUMPS.

This is a highly infectious disease which occurs in epidemics: the infection is given off by the breath. The disease is characterised by great and painful swelling of the glands behind and below the jaw, on one or both sides, causing great temporary disfigurement and accompanied by feverishness. The inflammation sometimes suddenly leaves the glands and occurs in other parts. The disease is nearly always of a comparatively trivial nature, producing much pain and discomfort, but not endangering life: the inflammation occasionally, but very rarely, terminates in an abscess. The disease usually occurs in young persons, and second attacks are rare.

The stage of incubation lasts from about eight days to three weeks.

Isolation for three or four weeks is requisite. The patient should be kept in bed, or a warm room, for a few days, and exposure to cold carefully guarded against during the attack, and for some little time after.

CHICKEN-POX.

Chicken-pox (varicella) is a highly infectious febrile disease, almost peculiar to childhood. About fourteen days after the reception of the specific poison, slight feverishness sets in, followed in a few hours by an eruption of red spots (papules), usually thickest upon the back and chest.

In less than twenty-four hours the spots change into little blisters containing fluid (vesicles). These dry up in three or four days and form scabs; a few days later the scabs fall off, leaving faintly red spots and sometimes a few pits. Series of crops usually succeed each other at intervals of twenty-four hours, and when they are numerous the disease may be prolonged to a fortnight, the usual time being about a week.

The disease almost invariably runs a favourable course, ending in recovery, and no after-mischief results from it. The infection is probably given off by the breath. The child should be confined to his bed or room for a day or two, and take only light diet; he should be isolated until all scabs have disappeared, and on no account return to school before this has taken place. Any child exposed to the poison should not be considered safe under eighteen days. Owing to the trivial nature of the disease disinfection is not usually practised.

INFLUENZA.

Influenza is an epidemic disease which has occurred at intervals during the last few centuries, and has usually spread over a large portion of the globe.

The first epidemic of which we have much information occurred in 1847–1848; no further epidemic made its appearance until the winter of 1889–1890, when the disease first appeared in Russia, later in Europe, and spread to England and America. We have since suffered in this country from two more epidemics of influenza.

This disease spreads with marvellous rapidity, hundreds of people being struck down at once; the rapid manner, too, in which the disease subsides is very characteristic. Horses and other animals are affected by influenza, and usually suffer from it before the epidemic has made headway in the locality as regards human beings (Whitelegge).

The period of incubation is short, probably not exceeding three days. The onset is sudden, with shivering, feverishness, severe pain in the head, eyes, and back, and muscular pains in the loins and elsewhere. The feverishness subsides usually in a day or two, but the pains often continue longer; and a sense of extreme prostration, which is present from the first, persists always for a few days, and often for some considerable time. Usually there is no nasal catarrh, but some redness of the eyes, and cold on the chest (bronchial catarrh). In some cases—and these predominate—the respiratory system is most affected; in others, the alimentary tract, and in some the nervous system alone. In some cases there is an eruption on the skin which may resemble the rash of measles, scarlet fever, or nettle-rash. The mortality is slight, except among persons weakened by disease or subject to chest affections, or in those who have been grossly careless, either from foolhardiness or necessity.

The complications at the time are principally those which affect the respiratory organs: the affections which are apt to follow are innumerable, to judge by the statements of doctors and patients. The one almost invariable affection is debility, which is trifling in some cases but very severe and long continued in others, and has to be felt to be thoroughly understood.

The practical question—Can anything be done to limit the spread of influenza by preventive measures? cannot, I am afraid, at present be answered in the affirmative.

Influenza is a comparatively new disease to most of us, and our ideas must be modified by every succeeding epidemic, until we are able to rely absolutely on the traditions of experience. For the present we must acknowledge that there can be no concerted action with regard to preventive measures. The general opinion appears to be that the disease is highly contagious; that it is due to the presence of a specific germ, and that the breath is highly infectious from the first; while some still believe it to be due to a peculiar atmospheric condition.

In some instances, a number of individuals in a house are attacked one after the other; in others there are only one or two cases in a house, all the rest escaping, though no precautions whatever have been taken. One attack gives the victim no immunity in succeeding epidemics, but apparently increases his chance of again falling a victim.

Whatever doubts there may be on the subjects of prevention and infection, the rules for nursing are definite; they consist in perfect rest in bed, in a warm, equable temperature, and nourishing fever diet.

The greatest care must be taken for some time afterwards, indeed until all signs of debility have disappeared; to avoid exposure to cold and overwork; plenty of nourishment must be taken.

PART II.

INTRODUCTION.

Those of my readers who have been interested enough to read through the first part of this book will, I hope, be rewarded by finding their interest much intensified in the second; and those who have contented themselves with just glancing at the first part and pronouncing it "dry" will, I hope, be sufficiently attracted by the second to return with renewed interest to the first. No one can deny that the subject of infectious diseases and their prevention is one of very great interest, and ought not to be confined to members of the medical profession. To the public it is entirely a matter of self-interest; to the ordinary medical man, a matter of unselfish damage to his own interests, which, nevertheless, he consistently disregards. As I have said before, this book is an attempt to popularise the subject—a subject which is influencing the lives, and causing the deaths, of so many of our people. It is stated that one-fifth of our mortality is due to these preventible diseases—preventible, but not prevented—so often even invited. The working classes of this country are continually agitating for legislation on matters which, they believe, concern their welfare; have they or their champions ever agitated for protection against a class of diseases to which they are specially exposed, against which they are almost powerless, and yet which might, to say the least, be considerably reduced? The annual mortality from these deaths can be estimated; but who can estimate the suffering and expense which they annually entail on the working classes? If these classes only knew how avoidable is the greater part of this suffering and expense, would they not ere now have agitated for the immediate notification of infectious diseases being everywhere made compulsory? And should we not find that fever hospitals were the rule and not the exception in all parts of the country?

Sanitary reformers do not look for perfection in sanitary matters in this world, but they aim at it, and while doing so they are often struck with amazement at the unsympathetic attitude of a portion of the public with regard to their work. Especially is it surprising to see the carping and unfair criticism passed upon those of them who, in the interests of science, and under strict supervision, perform a few perfectly painless experiments on animals, for the lasting benefit of the human race, and not to gratify their sporting instincts, or to fill their stomachs with animal food. If these fault-finding people would only use the energy and ability which God has given them in trying to ameliorate the condition of the poor in our large towns, and in seeing that they had accommodation at least as good as that provided for carriage horses, their energy would then be diverted into good and useful channels. Instead of delaying the wheels of sanitary progress, as they are now endeavouring to do, they would be working hand in hand with men who, however they may be maligned, are, in my opinion, among the noblest of the human race.

MEASLES.

In the year 1846, a sick sailor imported the infection of measles into one of the Faroe Islands, where there had not been a single case of the disease for sixty-five years. The population of the island was 7782; out of this number 6000 were attacked, only those persons who had previously had the disease, and 1500 who were kept out of the way of infection, escaped.

This instance is of very great interest as showing the specific character of the poison and its terribly infective nature.

The first point is also well borne out by the following: During the ten years 1851 to 1860, out of the 627 registration districts into which England is divided, only one had no death from measles, scarlet fever or small-pox, all the rest had deaths registered from one or all of them; the district which had entire immunity was that of the Scilly Isles. The reason of this was not its generally good sanitary state (for it had a fair amount of illness due to insanitary conditions), but was owing to infectious disease not having been imported; during that time at least the germs of these diseases had not arisen spontaneously.

Measles, generally a mild disease, occasionally is so malignant that the usual mortality of 1 to 5 per cent. runs up to 30 or more. Among the aborigines, notably in Fiji in 1874, the mortality has been very excessive. The disease had never been known before, so that there was entire absence of such protection as is afforded by a previous attack.

SCARLET FEVER.

It is highly important, by thorough isolation, to prevent the infection of one young child from another, for, according to Dr. Whitelegge, "In shielding a child against infection during the first years of life there is a double gain; every year of escape from scarlet fever renders him less and less susceptible, until finally he becomes almost unsusceptible; and, secondly, even if he should ultimately take the disease, every year that the attack is deferred reduces the danger to life which it brings. In other words, attacks of scarlet fever becomes less severe and less frequent with every year of age after the fifth. Up to the fifth year the liability is less (than in the fifth year) but the risk to life in case of attack is very great." The liability to attack is small in the first year of life. Many people never have scarlet fever. Scarlet fever apparently is considerably decreasing. In the ten years 1861–70 there were 97 deaths out of 100,000; in 1886 the number was reduced to 17 per 100,000. There is no doubt that scarlet fever is on the decrease, but it may not be permanently so to the extent the above figures indicate; the epidemic prevalence often occurs in cycles, and after a few years' diminution very great and fatal increase has occurred.

The occurrence of scarlet fever in connection with milk supply has been frequently noted in recent years. The first was at Penrith in 1870; every house (except one), which contained children, and obtained milk from a particular dairy, suffered from the disease. On inquiry it was ascertained that a case of scarlet fever had occurred at the dairy before the outbreak; that the dairyman's wife often milked the cows and at the same time was nursing her child; and that the milk was brought into the infected house before distribution. At the International Medical Congress of London, 1881, sixteen instances of outbreaks of scarlet fever, supposed to be due to the milk supply, were brought under its notice. In 1882, Mr. W. H. Power had to report on a scarlet fever outbreak in London which coincided with the distribution of a certain milk supply in some London districts. He was unable to make out that the milk had been infected through any human agency, but was drawn to the opinion that it depended upon some cow-condition. Dr. Klein, following up these considerations, experimenting with human scarlatinal material, was able to transmit a distinct disorder to the cow and to transmit it from the cow to other animals.

In 1885 an extensive epidemic of scarlet fever occurred in Marylebone and other parts of London, and the disease was traced to several milk supplies obtained from Hendon. Mr. Power was again deputed by the Local Government Board to investigate the matter. He showed that the disease was caused by the Hendon milk; that there had been no pre-existing case in the human subject to cause infection of the milk; that the diffusion of the disease had to do with the milk of some of the cows, and only with some of them. The import of the above is that the Hendon disease is the same disease in the cow that, in the human subject, we call scarlet fever.

It is, in my opinion, very unfortunate that the terms scarlet fever and scarlatina are both in use, as many educated people have an idea that scarlatina is a mild form of scarlet fever; and that precautions which are necessary in the one case are quite uncalled for in the other. A few days ago a clergyman, in the course of conversation, expressed the same erroneous notion. No such distinction is recognised by medical men.

London has lately passed through a serious epidemic of scarlet fever.

A great element of uncertainty with regard to the size of this epidemic, as compared with previous ones, arises from the working of the Act for the Immediate Notification of Infectious Diseases. This Act enforces the obligation of immediate notification to the sanitary authorities of every case of scarlet fever, and as a further result of its working, patients are removed wholesale to the fever hospitals.

The necessary outcome of this Act must therefore be a large apparent increase of scarlet fever cases, a great strain on hospital accommodation, which would naturally be quite inadequate, at the height of the epidemic, to the public requirements, and a death-rate low, out of all proportion to previous London scarlet fever epidemics.

SMALL-POX.

This loathsome disease is comparatively little regarded by the public nowadays, its ravages having been so greatly checked by vaccination. I therefore propose to give some information on "Small-Pox before the Discovery of Vaccination" by Sir John Simon, this will, I feel sure, interest and, at the same time, surprise many of my readers. Vaccination has been so long decried that a generation has arisen comparatively ignorant of the awful virulence of this scourge of times past; the formidable nature of the enemy is therefore underrated and no advantage seen in the precautionary and preventive measure of vaccination. People have been taught to look upon it as, in itself, an awful risk, with no, or scarcely any, compensatory advantage. I hope after reading Sir John Simon's forcible statements they may be somewhat mistrustful of their fancied security. "To the civilised classes of society it has now almost ceased to be a fatal disease;

and among them accordingly there is a temptation to forget how their fathers and grandfathers regarded it. Hence, in the middle of the nineteenth century the very success of vaccination may have blinded people to its importance. It is so easy to be bold against an absent danger; to despise the antidote while one has no painful experience of the bane. Yet indeed, apart from historical records, our present daily experience of the nature of the disease might almost enable us to construct a description of the course which it has run. To know of it, that it is *fatal to a very large proportion of those whom it attacks;* that it *is eminently infectious from person to person;* and that it *seizes, with very few exceptions, on all who for the first time come within its range;* this, if one reflects on it, is almost to have read the story of its ravages, and their details may be conjectured. To remote or insular populations, having infrequent and difficult intercourse with the busier masses of mankind, such an infection would come seldom; but having come, it would find, perhaps, the entire generation prone to receive it. There might have been no previous visitation within living memory. None of the population would have earned exemption by having suffered in a former epidemic. The disease, under such circumstances, must have ravaged more fiercely than the most ruthless of human wars. Its effect on mankind must have been comparable to that obliteration of vegetable life which ensues when the army of locusts, descending on pastures and vineyards, and sweeping onward with fatal procession, converts into the likeness of a desert what just before was all freshness and fertility. In every country, probably, its first invasion has been of this kind; and its recurrences, when far apart, have been of equal malignity. Thus it was that, in 1518, following European adventure to the Western world, it concurred with fire and sword and famine and bloodhounds to complete the depopulation of

St. Domingo; thus, that soon afterwards, in Mexico, it even surpassed the cruelties of conquest, suddenly smiting down three and a half millions of population and leaving none to bury them; thus, that in Brazil, in the year 1563, it extirpated whole races of men; thus, that about the same period, in the single province of Quito, it destroyed upwards of 100,000 Indians. And thus, too, it has been in later days that Siberia and Kamschatka have been ravaged; thus, that again and again, till very recent times, the same dreadful pestilence has depopulated Greenland and Iceland. Before the terror of its presence communities literally dissolved themselves; and the well-known description of the plague at Athens does not convey more dreadful images of human suffering than may be gathered from the writings of those travellers who, even to the latest times, have witnessed the power of natural small-pox against remote unprotected populations. While such was small-pox in the less travelled parts of the world, it seems certain that in civilised Europe, with its constant intercourse of towns and countries, the disease was at least as deadly. Its strength, indeed, was differently distributed.

"Not, as in Greenland, only twice or thrice in a century, but with one incessant process, that fatal sickle was ever in motion, and the increments of its harvest were from day to day. Instead of coming after long absence on masses of population entirely unprotected against the infection, the disease recurred in each place so frequently that, for the most part, at any given moment, a more or less considerable majority of the inhabitants would have faced the danger before. They would have obtained against its attacks that protective exemption which was generally the good fortune of survivors.

"But it is a moderate computation that for every five persons thus, at the price of much past suffering, almost secured against the disease, one at least must have died

The annual ravages of small-pox in Europe alone have been estimated at half a million of lives. M. de la Condamine reckoned that in France a tenth of the deaths were by small-pox: Rosen's estimate of Sweden was to the same effect. For our English experience, there exist only imperfect records, but it seems that, within the London bills of mortality, small-pox, when not at its worst, averaged a fourteenth of the annual total of deaths; a fourteenth, too, at times when that total, as compared with the population, represented perhaps double our present death-rate. For a popular notion of the disease it may be enough to cite what it did in royal families. In the circle of William III., for instance: his father and mother died of it, and not least, Mary his wife; also his uncle, the Duke of Gloucester; also his cousins, the eldest son and the youngest daughter of James II.; while he himself (like his friend Bentinck) had suffered from it most severely, barely surviving, with a constitution damaged for life. Again, in the Court of Austria: "Joseph I. [says Vehse] was carried off, when not more than thirty-three years of age, by the small-pox, to which, in the course of the eighteenth century, besides him, two empresses, six archdukes and archduchesses, an Elector of Saxony, and the last Elector of Bavaria, fell victims."

To this last might have been added, no doubt, many other names; among them, for instance, a dauphin and a king of France, a queen of Sweden and an emperor of Russia. It would be thought an awful epidemic nowadays that would strike like this in high places. Yet the ravages of small-pox are not half enumerated in the list of the myriads whom it killed. From the earliest to the latest medical records of the disease there is constant mention of the tax which it levied upon the survivors. Among those who outlive it many either totally or partially lose their sight or hearing, many are disfigured for life by horrid scars, and become shocking objects to those who approach them.

Sir Gilbert Blanc, at a later period, quoted a report of the Hospital for the Indigent Blind, to the effect that two-thirds of those who applied for relief there had lost their sight by small-pox. Worst of all were these ill effects in persons already of feeble, especially of scrofulous constitutions. Nothing (says Dr. Gregory) developes that tendency more than protracted small-pox. It is scarcely needful to say of the disease I have described, that it was a constant source of terror among all civilised nations. Each time that the contagion was reintroduced to a place, all who had not been touched in previous visitations (including especially such children as had been born in the interval) might expect to become subjects of attack. Accident in individual cases might delay this dangerous moment; but for nearly all it was only delay. Of persons not prematurely cut off by other diseases, in the long run very few escaped this infection. Seventy years of age was no security; and for such as were disposed to triumph at the end of an epidemic which had spared them, there was often quoted the old saw, *Nemo ante obitum beatus.* Thus, at every rumour of the disease, men might tremble for the valuable lives of others or their own; and that horror of the living patient, which so loathsome an infliction occasioned, became, when death had ended his suffering, a very panic towards his corpse. Perhaps at no previous moment in English history had the horror of small-pox been greater or more fully justified than at the beginning of the last century.

And now, for the first time, there came to us a story that we could, so to speak, make terms with this loathsome and murderous enemy; that, by receiving it of our own accord, we could disarm it; that we could (as it was expressed) "buy the small-pox cheap;" that the susceptibility to contract its fatal infection could be exhausted by artificial means, giving, indeed, the disease, but giving it so mildly, that life was almost unendangered in the process.

This, indeed, was substantially the fact, and to the present time it remains one of the most interesting and least explained facts in pathology, that the specific contagion or ferment of small-pox, so uncontrollable in its operations when it enters a man in the ordinary way through breathing an infected atmosphere, becomes for the most part disarmed of its virulence when it is artificially introduced into the system through a puncture in the skin, so that a person exposed to this artificial infection very generally contracts the disease in its mildest and most tractable form.

This practice, commonly known in England as inoculation for the small-pox, seems to have been followed for ages in the East. Not only, it is said, had the Chinese since the sixth century been accustomed to procure, by special means of their own, an artificial infection of the disease, but the Brahmins from remote antiquity had practised the very operation which was now to be discussed in England. Inoculation for small-pox was introduced from the East about 1720 by Lady Mary Wortley Montagu. Mild cases were selected for purposes of inoculation: the mortality was much lower than that of "natural" small-pox, being only 2 or 3 per cent. The risk was by no means trifling, but people were quite ready to undergo it; it moderated the severity of the disease but assisted its spread; each person inoculated for small-pox became, if due care was not taken, a centre of infection, and numberless centres were in this manner created. The process was forbidden by law in 1840.

About the year 1796 Jenner introduced his grand discovery of vaccination, which had these advantages over inoculation: that it was almost free from danger to the person vaccinated, and that he was not a source of danger to others. "Since that time vaccination has made steady progress throughout all classes of the population, with the result of gradually diminishing the frequency of epidemics, the severity of the disease, its incidence on the population and its death rate. In 1838 gratuitous vaccination was provided, and in 1853 vaccination became compulsory for all infants above the age of three months; but it was not until 1871 that Boards of Guardians were obliged to appoint public vaccinators for their districts" (Parkes). Dr. Whitelegge shows from the statistics of the Sheffield epidemic of 1887–88 that "the vaccinated part of the population had, as compared with the unvaccinated, *at ages below ten years*, a twenty-fold immunity from attack, and four hundred-and-eighty-fold security against death from small pox; *at ages above ten years*, a five-fold immunity from attack, and fifty-one-fold security against death from small pox; at "all ages" a six-fold immunity from attack, and a sixty-four-fold security against death from small-pox."

Re-vaccination renews the immunity given by primary vaccination; if properly performed it generally holds good for life, and if, by any chance, the disease is acquired, it is usually of the mildest type. In Prussia, vaccination and re-vaccination were made compulsory in 1874, thereby reducing small-pox mortality as much as nine-tenths. Not a single death from this disease, it is said, has occurred in the Prussian army since 1874. Dr. Whitelegge has very conveniently summarised the evidence on the subject of vaccination as follows:—

"A. *As regards vaccinated and unvaccinated populations respectively.*—(1) In pre-vaccination times the heaviest incidence of small-pox was upon childhood. (2) In the unvaccinated parts of the community it is so still. (3) Among vaccinated persons childhood is exempt, and small-pox is only fatal in later years, where the protective influence of vaccination has faded. (4) In a mixed community (vaccinated and unvaccinated) both these effects are apparent, the heavier incidence upon the unvaccinated compensating for their scanty numbers. (5) The immunity at early ages among the vaccinated may be extended indefinitely by re-vaccination. (6) In every epidemic, in every community, and in every year—if the numbers are sufficiently large to preclude the fallacy—the unvaccinated suffer more attacks *in proportion to their numbers* than the vaccinated, and a larger percentage of the attacks are fatal. (7) Among the vaccinated who suffer from small-pox in later years, the proportion of fatal to non-fatal attacks diminishes with the number or area of the cicatrices.

"B. *As regards entire populations.* — (8) The introduction of vaccination has in all cases been followed by a lowered average incidence of small-pox. (9) Each extension of compulsory re-vaccination has almost suppressed small-pox."

Re-vaccination is not compulsory; any one, however, over twelve can be re-vaccinated gratuitously at a public station, or at the age of ten years if small-pox threaten.

Before leaving this subject I would remark upon the objection, and the reasonable objection, to small-pox hospitals in centres of population. It is now admitted that an aggregation of small-pox patients causes an increase of small-pox in its neighbourhood. The accepted explanation is, that when a sufficient number of acute cases are brought together in one building in a confined area, the hospital becomes a centre of infection to the surrounding neighbourhood, the germs being transmitted through the atmosphere by currents of air and winds. This was well shown during the outbreak in 1884 and 1885, when the Fulham Small-pox Hospital undoubtedly acted as a centre of infection to the surrounding neighbourhood. A similar state of things, very possibly from the same cause, was observed during the Sheffield epidemic; when a new hospital outside the borough was used, instead of the old one which was in a thickly populated part, the excessive incidence of disease upon the area round the old hospital ceased.

The subject of vaccination is engaging the attention of a Royal Commission, which has not yet reported the result of its labours.

DIPHTHERIA.

Although diphtheria apparently does not invariably rise from an antecedent case of the same affection, yet, says Dr. Thorne Thorne, "Its epidemic spread is largely due to personal inter-communication, and this especially amongst children between the ages of three and twelve years, an age incidence that necessarily involves the question of attendance at elementary schools. Numerous investigations have been made which show the marked influence of school attendance and of age as a cause of diphtheria spread." Dr. Thorne Thorne goes on to say that, "In an outbreak which he reported to the Local Government Board early in 1877, and in which no less than 170 diphtheria attacks had occurred in a population of 3309 living at Great Coggeshall in Essex, 7·1 per cent. of the children between 0–15 years were attacked; between 0–3 the attacks were at the rate of 4 per cent.; from 3 to 12 years they were 8·4 per cent., and from 12 to 15 years, 4·8 per cent.; the incidence of the disease upon children from 3 to 12 being about 50 per cent. greater upon those known to have attended school than upon the remainder." The infection of diphtheria like that of typhoid and scarlet fever, is occasionally conveyed through the milk supply. In 1878 an epidemic of diphtheria occurred in North London, and Mr. Power traced a decided connection between the disease and a certain milk supply. The circumstances were such that the question arose whether the cow herself was not concerned in the infection of the milk. In 1883 inquiry was made into two diphtheria epidemics—one at Hendon by Mr. Power, and the other at Devonport by Dr. Parsons. In the Hendon epidemic the inquiry pointed most strongly to the milk being infected; again it appeared that the outbreak might be due to some cow condition able to produce diphtheria in the human subject. Before this date many observers had "expressed suspicion that the contagion of the disease might be due to conditions affecting the brute creation, and others had associated it with fungoid growths of a vegetable character." Mr. Power later on inquired into a diphtheria outbreak at York Town and Camberley. With regard to this latter outbreak Dr. Thorne Thorne states that it "was ascertained to have been due to milk which had clearly received its infectiveness before it left the farm where it was produced; but the incidence of the disease on the better class of consumers as compared with the cottagers and tradesfolk was as 29·3 to 6·2, and it having been ascertained that the excess of disease was brought about apart from the use of cream, it became apparent that the *amount* of milk consumed, involving, as it did, *inter alia*, differences of *number of opportunities* for infection, had been all-important in bringing about this result. And again, the better class people stored their milk and did not, like the other class, use it directly after purchase; and thus an opportunity was given in the former case for the development and multiplication of any infective material present in it, and so of giving to the milk a superior ability to convey infection. In this case there was a complete absence of evidence as to infection of the milk directly by human agency, or owing to unwholesome conditions at the farm; but, as regards disease in the cow, it could only be stated that the outbreak had been related in point of time to the process of calving and 'cleansing' in two of the cows belonging to the dairy-farm, and to the existence in another cow of a 'scab or crust,' not unlike those which, at a later stage of the malady, had been observed to replace ulcers on the udders of certain Hendon cows referred to in connection with scarlet fever."

Dr. Thorne Thorne concludes, after stating that diphtheria has shown a tendency to increase, by saying, "yet there is reason for some confidence that the study devoted to the etiology of the disease, especially during recent years, has tended towards the ultimate discovery of those measures by means of which a substantial check may before long be put upon the increasing fatality of diphtheria."

TYPHOID FEVER.

In the year 1840 considerable doubt was thrown upon the universally received opinion that typhoid and typhus were one and the same disease. But the doctrine of the non-identity of the two diseases was by no means thoroughly accepted until Sir William Jenner's researches removed all doubt on the subject. He showed that the two diseases did not necessarily occur together, that one did not communicate the other, and that they depended on different causes.

Commenting on the above, Dr. Thorne Thorne says: "But there probably never was an occasion where so much depended on correct diagnosis as when these two diseases were once for all dissociated from each other. So long as one 'fever' was alone recognised, the fatality which, on the one hand, attached to our gaols, camps and city tenements, where misery and excessive crowding obtained, was confused with that which, on the other hand, occurred alike in the mansions of the wealthy—to which sewer-air had by ill-contrived arrangements been laid on—and in scattered rural districts, where the need for the proper disposal of excreta was not yet recognised. This confusion of the two diseases barred the way to progress in preventive medicine. But, when once the distinction was made, the road was clear. The remedy needed for the prevention of the one disease had little in common with that for which the other called; and whilst the removal of conditions favouring that form of filth which comes of an air laden with the accumulated emanations of a crowded and destitute people rid our towns of typhus, it was found necessary, for the prevention of enteric fever (typhoid), to cope with the varying circumstances under which poisoning by means of the excreta of populations could operate, either through water and food consumed, or through air breathed. Medical science having once indicated the directions in which medical measures were needed, the work of prevention could be intelligently pushed forward; and I may truly say that its rapid advance, and the widespread benefits resulting from it, have been largely due to the impulse given by the skilfully discovered differentiation of these two continued fevers."

Dr. Thorne Thorne goes on to say: "After Mr. Simon had for nine years held office as Medical Officer to H.M. Privy Council, he still found it necessary continuously to advise—first, that by appropriate structural works, all the excremental produce of the population shall be so promptly and so thoroughly removed, that the inhabited place, in its air and soil, shall be absolutely without fæcal impurities; and, secondly, that the water supply of the population shall be derived from such sources and conveyed in such channels that its contamination by excrement is impossible."

And as regards enteric fever, he went on to show, by reference to Dr. Buchanan's well-known report on the results gained in various parts of England by works designed to promote public health, how remarkable has been its diminution since the execution of efficient sanitary works. To quote a few examples only. Comparison between the enteric fever annual death-rate per 10,000 people living after the execution of such works, with that for periods which have preceded them, showed that there had been a fall at Merthyr-Tydvil from $21\frac{1}{3}$ to $8\frac{2}{3}$, at Croydon from 15 to $5\frac{1}{2}$, at Ely from $10\frac{2}{5}$ to $4\frac{1}{2}$, at Penrith from 10 to $4\frac{1}{2}$, and at Stratford from $12\frac{1}{2}$ to 4."

We now come to the dissemination of typhoid fever by milk, about which Dr. Thorne Thorne writes: "In May, 1858, Dr. Michael Taylor wrote a paper in the *Edinburgh Medical Journal* on 'The Infection of Fever by Ingesta,' in which he suggested that an outbreak of what we know now to have been enteric fever was due to specific contamination of milk, derived from a dairy where the disease prevailed. This report received but little publicity. It was followed in 1870 by a report from Dr. Ballard, then Medical Officer of Health for Islington, who had succeeded in tracing a prevalence of the same fever to the distribution of a particular milk service within less than a semicircle of a quarter of a mile radius; 168 cases of that disease occurred within ten weeks, and the occurrence could not be explained by any of the ordinarily recognised means with which the spread of that disease was then known to be associated. Gradually a suspicion arose that there was some connection between the outbreak and the use of milk from a certain dairy; but the idea was still a novel one, and it was only after further exhaustive investigation that Dr. Ballard was at last in a position to demonstrate that connection as the true explanation of the disease; but of 140 families supplied from the dairy in question, there were no fewer than seventy attacks, with thirty deaths, the disease picking out, as it were, its victims from the homes of the dairy customers living widely apart, in different streets and squares, and showing a marked incidence on large consumers of milk. And, finally, it was ascertained that water from a tank in direct communication with some old drains had been used for dairy purposes. In 1873 there followed the admirable report by Mr. Netten Radcliffe and Mr. W. H. Power, on a wide-spread epidemic of the same disease in West London. It was traced to the use of milk from a large London dairy, and the ultimate conclusions arrived at made it practically a certainty that the milk in question was 'infected with enteric fever material,' and that, at the particular farm from which it was derived, the water used 'for dairy purposes contained excremental matters from a patient suffering from enteric fever immediately before and at the time of the outbreak.' Numerous instances of the same sort were gradually brought to light, and there were soon strong indications to show that milk formed a specially favourable vehicle for the propagation and distribution of the contagion of this and of other diseases. Outbreaks of enteric fever have since, in the same way, been traced to the use of cream; and, later on, the occurrence of infectious diseases as the result of the use of ice and iced creams, prepared with materials containing the specific poison of disease, went to prove that the process of freezing did not suffice for the destruction of the contagion in question."

Dr. James F. Allen, Medical Officer of Health to the Corporation of Pietermaritzburg, contends that his South African experiences warrant him in believing that there is a disease in cows and calves allied to that of enteric fever in man, and that enteric fever may be produced in man by means of milk from cows suffering from the corresponding bovine disease.

Dr. Thorne Thorne states that: "In the meantime a new channel for the dissemination of enteric fever had been discovered. In 1873, Dr. Blaxall, during the course of an inquiry into an outbreak of enteric fever at Sherborne, had found that, during intermissions in a public water-service, foul matters had facilities for getting into water mains; and, in the following year, Dr. Buchanan was able to show conclusively that a localised spread of enteric fever in Caius College, Cambridge, had been mainly due to the suction of specifically contaminated air and other matters into the water-pipes of a particular portion of the college during intermissions in the water service, and to the subsequent mingling of this air with the water used for drinking purposes. And, late in the same year, I had occasion to trace an epidemic of the same disease in Lewes to a precisely similar cause. In this instance a wide-spread diffusion of the disease took place, and no less than 486 attacks, with some forty deaths, resulted before the mischief could be checked by the substitution of a constant for an intermitting water-service. Since that date the conditions under which intermitting water-services become dangerous to the public health have been very generally recognised, and, as a consequence of investigations such as I have referred to, additional measures for the prevention of enteric fever have become practicable.

"Year by year evidence was accumulating to show how great was the potency for mischief of even minute portions of the specifically diseased evacuations of enteric fever patients, when such matter was placed under circumstances favourable to its multiplication and its communication to man.

"One of the most striking instances of this potency occurred in the epidemic of enteric fever which I had to investigate, in 1879, in the wide area over which the Caterham Water Company distributed their supply. In that case 352 cases of enteric fever took place at Caterham, Redhill, and certain intervening places, some 200 of the earlier cases being traced directly to the use, during a particular fortnight, of water derived from a deep well in which a man suffering from that disease had been employed, under circumstances which left no possible doubt that his excreta had got access to the well-water. In this case it was estimated that after all possiblity of further pollution had come to an end, no less than 18,611,000 gallons of water had been pumped from the well during the fortnight in question, and Dr. Buchanan in dealing, in his annual report for 1881, with the question of the amount of specific pollution which might suffice to render a potable water dangerous, showed that, in their case, the water could have contained no such amount as one grain of excremental matter per gallon ; and he brought forward considerations tending to prove that an amount of specifically polluting matter so infinitesimal in quantity as to be altogether beyond detection by chemical analysis was fully potent for mischief. It may, indeed, now be claimed as one of the most settled principles of preventive medicine that all excremental filth, irrespective of its quantity, must be regarded as potentially noxious to man ; and that, for the prevention of such a disease as enteric fever, 'the one essential is cleanliness.' Much has been done, very much indeed remains to be done, but it is satisfactory to find that the deaths from enteric fever have steadily declined. In 1869 the number of fatal attacks from enteric and simple continued fever in England and Wales was 13,967. During the five years 1876–80 the average annual number of deaths had fallen to 8657, and in 1881–5 it had fallen to 6671 ; the above reduction, too, was in spite of a steady increase in population."

TYPHUS FEVER.

This disease is essentially associated with overcrowding and destitution, the first of these conditions appearing to be absolutely necessary for the generation of specific poison. To Sir John Simon is due, I believe, the great credit of drawing public attention to this point by the ghastly pictures which he drew of the terrible overcrowding in the City of London, and the misery and disease consequent upon it. As a result of his powerful invective the most happy results have followed, not only in London but in other large towns. The harrowing state of things that Sir John Simon described in his City of London reports have undoubtedly become greatly modified, but can by no means be said to be non-existent. We boast that ours is pre-eminently a Christian country: be that as it may, we have still heathen in abundance, who can hardly be anything but heathen when their surroundings, physical and moral, are properly taken into account.

It will be interesting and instructive to my readers if I acquaint them with extracts from Sir John Simon's classic reports of the miserable condition of many of the dwellers in the City of London in the year 1849. "It is too true that among these classes there are swarms of men and women who have yet to learn that human beings should dwell differently from cattle; swarms to whom personal cleanliness is utterly unknown; swarms, by whom delicacy and decency in their social relations are quite unconceived." Then follow some particulars of some terrible and indecent overcrowding which I must omit. "Such are instances recently within my knowledge of the degree and of the manner in which a people may relapse into the habits of savage life when their domestic condition is neglected, and when they are suffered to habituate themselves to the uttermost depths of physical obscenity and degradation. Those who suffer under the calamitous sanitary conditions which I have disclosed have been led, perhaps, to consider them as inseparable from poverty; and after their long habituation to such influences who can wonder if personal and moral degradation conform them more and more to the physical debasement of their abode? In the midst of inevitable domestic filth, who can wonder that personal cleanliness should be neglected? In an atmosphere which forbids the breath to be drawn freely, which maintains habitual ill-health, which depresses all the natural spring and buoyancy of life, who can wonder that frequent recourse should be had to stimulants, which, however pernicious in themselves, still for a moment dispel the malarious languor of the place, give temporary vigour to the brain, and cheer the flagging pulses of a poisoned circulation? Who can wonder that habits of improvidence and recklessness should arise in a population, which not only has much ignorance and prejudice against it, but is likewise unaccustomed to consideration and kindness? Who can wonder that the laws of society should at times be forgotten by those whom the eye of society habitually overlooks, and whom the heart of society often appears to discard? I believe that now there is a growing feeling abroad that the poor of a Christian country can no longer in their own ignorance and helplessness be suffered to encounter all the chances which accompany destitution, and which link it often indissolubly to recklessness, profligacy and perdition. The task of interfering on behalf of these classes, however insensible they may be of their own danger and frequent degradation, begins at length to be recognised as an obligation of society; and as such an interference may be fraught with the utmost advantage to sanitary progress, I shall now proceed to point out the manner in which, with this view only, it may most usefully and most humanely be made."

In another report, after describing the most awful condition of the dwellings of the poor, and especially of the courts and alleys, Sir John Simon explains that even if the sanitary arrangements were good the constructional defects of the houses and courts, which excluded all light and air, were such that fever and the allied disorders could never be absent from their population, while "with nuisances round them and with organic poisons rising from the soil or mingling in the water, their mortality would rise to the horrors of pestilence and might easily renew the most awful precedents in history."

"In habitations of this kind the death rate would of necessity be very high, even if the population were distributed thinly in the district. A single pair of persons with their children having such a court for their sole occupancy could hardly be otherwise than unhealthy; the infants would die teething, or would live pallid and scrofulous, or a parent would perish prematurely—the father, perhaps with typhus, the mother with puerperal fever. Judge then, gentlemen, how the mortality of such courts must swell the aggregate death-rate for the City, when I tell you that their population is in many instances so excessive, as, in itself, and by its mere density, to breed disease. Statistics can give no conception of the crowding. Instances are innumerable in which a single room is occupied by a whole family—whatever may be its number, and whatever the ages and sexes of the children; where birth and death go on side by side; where the mother in travail or the child with small-pox, or the corpse waiting interment, has no separation from the rest." In another place he states: "Typhus prevails there not as an occasional visitor but as an habitual pestilence;" and further: "It was in districts such as these that in the year 1665 the Great Plague of London found the readiest facilities for its reception, and it was by the destruction of such districts that the Great Fire of the following year rendered the utmost conceivable service to the sanitary progress of the people, and completed their emancipation from the horrors of an unparalleled pestilence. Long intervening years have sufficed to reconstruct these miserable habitations almost after their first type, and to re-exemplify all the evils which belong to them, so completely, indeed, that if the infection of that same plague should light again amongst us, I scarcely know why it might not traverse the City and decimate its population as quickly and as violently as before. Meanwhile, however, typhus, with its kindred disorders, and the occasional epidemics of influenza and cholera, maintain their attachment to the soil, and require no further reinforcement from the pestilence of other climates. From these fatal diseases we no longer hope to be rescued by the former casualty. The almost two centuries which have elapsed since the period referred to have taught men better methods than a general conflagration for remedying such evils, and it is a satisfaction to believe that the wisdom and humanity of the Corporation of the City of London will apply these methods with effect."

The moral effect produced by these terrible sanitary defects and evil surroundings is most graphically described by Sir John Simon in the following words: "Who can wonder at what becomes, physically and morally, of infants begotten and born in these bestial crowds? In my former report I drew your attention to this pestilential heaping of human beings, and suggested to you its results, and on many occasions during the past year, complaints have been before your Honourable Court which have had their real origin in this uncontrolled evil. I revert to it because of its infinite importance. While it maintains physical filth that is indescribable, while it perpetuates fevers and the allied disorders, while it creates mortality enough to mask the results of all your sanitary progress, its moral consequences are too dreadful to be detailed. I have to deal with the matter only as it relates to bodily health. Whatever is morally hideous and savage in the scene, whatever contrast it offers to the superficial magnificence of the metroplis, whatever profligacy it implies and continues, whatever recklessness and obscure brutality arises from it, whatever deep injury it inflicts on the community, whatever debasement or abolition of God's image in men's hearts is tokened by it—those matters belong not to my office, nor would it become me to dwell on them. Only because of the physical suffering am I entitled to speak; only because pestilence is for ever within the circle; only because death so largely comforts these poor orphans of civilisation. To my duty it alone belongs, in such respects, to tell you where disease ravages the people under your charge, and wherefore; but while I lift the curtain to show you this—a curtain which propriety might gladly have left unraised—you cannot but see that side by side with pestilence there stalks a deadlier presence; blighting the existence of a rising population, rendering their hearts hopeless, their acts ruffianly and incestuous, and scattering—while society averts her eyes—the retributive seeds of increase for crime, turbulence and pauperism."

Dr. Thorne Thorne states that "since 1869 there has been an almost continuous decrease of typhus deaths in England, the fatal attacks falling from 4281 in that year to 318 in 1885. In London there were 716 typhus deaths in 1869; but since that date this mortality has undergone rapid and almost continuous decrease, until in 1885 there were only 28 such deaths.

DIARRHŒA.

I have stated in the first part that to whatever cause this disease may be attributed, a continued high atmospheric temperature with *increased temperature of the soil* is always, apparently, the principal factor which determines a large or a small epidemic of diarrhœa.

The following is a short, but interesting epitome of Dr. Ballard's report upon the "causation of the annual mortality from diarrhœa, which is observed principally in the summer season of the year." I have extracted it from Dr. Parkes' "Hygiene." "The summer rise of diarrhœal mortality in the large towns does not commence until the mean temperature recorded by the earth thermometer, placed four feet below the surface, has attained somewhere about

560 F.—no matter what may have been the temperature previously attained by the atmosphere, or recorded by the one-foot earth thermometer, the maximum diarrhœa mortality of the year is usually observed in the week when the four-foot earth thermometer attains its mean weekly maximum. The diarrhœa mortality declines with the four-foot earth thermometer, and this decline takes place very much more slowly than that of the atmospheric temperature or of the one-foot earth thermometer, so that the mortality from epidemic diarrhœa may continue long after the air temperature has fallen, even in the fourth quarter of the year."

I have only given that portion of Dr. Ballard's report relating to the influence of the temperature of the earth over diarrhœa mortality. Upon the above, and many other observations, Dr. Ballard bases the provisional hypothesis :—

"That the essential cause of diarrhœa resides ordinarily in the superficial layers of the earth, where it is intimately associated with the life processes of some micro-organism (germ) not yet isolated.

"That the vital manifestations of such organism are dependent . . . . on conditions of season and the presence of dead organic matter which is its pabulum (food).

"That such organism is capable of getting abroad from its primary habitat the earth, and having become air-borne obtains opportunity for fastening on non-living organic material (especially food, whether within or without the body) which serves as nidus (nest) and pabulum.

"That from food and from organic matter in certain soils it can manufacture a virulent chemical poison, which is the material cause of epidemic diarrhœa."

I cannot leave this subject without again borrowing from one of Sir John Simon's reports the following: "Few things in medicine seem more certain than the general meaning of high diarrhœal death-rates. The mucous membrane of the intestinal canal is the excreting surface to which Nature directs all the accidental putridities which enter us, whether they have been breathed, or drunk, or eaten, or sucked up into the blood from the surfaces of foul sores, or directly injected into blood-vessels by the physiological experimenter, there it is that they settle and act. As wine 'gets into the head,' so these agents get into the bowels. There, as their universal result, they tend to produce diarrhœa—simple diarrhœa, in the absence of specific infections: specific diarrhœa when the ferments of cholera and typhoid fever are in operation. And any such distribution of diarrhœal diseases as has just been noticed, warrants a presumption, indeed, so far as I know, a practical certainty, that, *in the districts which suffer the high diarrhœal death-rates, the population either breathes or drinks a large amount of putrefying animal refuse.* A certain, but inconsiderable, quantity of diarrhœa depends on other causes than putrefactive pollution of the system."

CHOLERA.

This dreaded disease has recently caused terrible havoc in Russia and Hamburg. Our country has, up to now, been providentially spared, through the great activity, zeal, and discretion shown by our medical officers at seaport towns, and especially at the port of London, thanks to the untiring energy of Dr. Collingridge and his able assistants. We feel confident that the same active precautions will be continued this year, when they will be more than ever necessary, as when cholera has obtained a firm footing in this country it has always been in the second year, as I will shortly proceed to show. No apology will be needed on my part for going fully into this subject, as it must for months be before the minds of the public, and in the hearts of all the custodians of the public health. No apology, either, will be given for quoting largely from the invaluable reports of Mr. Simon, which can never be excelled for their perfection of lucid argument, and their beauty of language. They are, however, confined to the very few; a cheap edition of them would be a public boon.

Cholera is always present in parts of India and the East. It becomes, at times, epidemic, and thence extends into distant countries, by sea, or overland, through persons suffering or recovering from it, or possibly, by means of infected articles. The first great epidemic in India occurred in 1817. Asiatic cholera, as it is called, was unknown in Europe before 1829, but had prevailed in India for many centuries.

I am indebted to Dr. Whitelegge for the following:

"The first appearance in England was in 1831–2, the second 1848–9, the third 1853–4, and the fourth 1865–6, the epidemic extension from India having occupied respectively, five, two, one, and two years in transit. On several other occasions the disease has invaded Europe, but failed to reach England, notably in 1871–4, and 1884–7. In 1831 infection was carried to Sunderland and Newcastle from Baltic ports in October, and, in the course of the next year, caused great mortality in almost all the populous parts of the Kingdom. No exact figures can be given, as the system of registration of deaths was not then in operation. According to Hirsch the total mortality in England was 30,424. In 1848 Hull was infected from Hamburg early in October, and the disease at once spread.

"Only 988 deaths were recorded in England from October to March, but the epidemic made rapid progress in the summer, and before its final disappearance in December 1849, it had caused 53,293 deaths, besides a heavy diarrhœa mortality, part of which may be supposed to be due to cholera.

"In 1853 the invasion was again from Germany, London being attacked in August. The outbreak continued through the winter, especially in the north; it became more active in July 1854, and overran the country, causing, during the year, 20,097 deaths in England and Wales. The 1865 epidemic had a somewhat different history. Cholera was brought to Southampton from the Mediterranean several times during and after July, but only gave rise to an outbreak in September, October, and November, affecting about sixty persons in Southampton, and a few more in Dorsetshire and Essex. In the spring the disease was again repeatedly imported from the Continent; from Holland to Bristol in April, and to Liverpool and Swansea in May. Southampton was reinfected from the East in June, and in July the epidemic began in London. There were 5548 deaths attributed to cholera in London during 1866, and 14,378 in the whole of England."

I am indebted to Dr. Thorne Thorne for the following table, which does not include the epidemic of 1831–2, correct figures being, doubtless, unattainable:

CHOLERA MORTALITY.

	England and Wales.		London.	
Date.	Total deaths.	Deaths per 10,000 living.	Total deaths.	Deaths per 10,000 living.
1849	53,293	30	13,565	51
1854	20,097	11	10.684	43
1866	14,378	7	5.548	18

It will be very interesting to my readers, who are so vitally concerned in the answer to the question whether cholera will invade our country this year, to read the remarks made by Mr. Simon in 1853 under almost precisely similar circumstances. The remarks are taken from his fifth annual report, Nov. 1853. He says: "Two years ago, adverting to the non-completion of metropolitan sanitary works on which the health of entire London is vitally dependent, I could not but comment on the utter unpreparedness with which the metropolis was awaiting any sudden return of Asiatic cholera. It was indeed impossible to foresee how soon, or how late, that dreadful visitation might recur to desolate our homes—whether it might return at once, or never. But typhus—averaging in fifteen years double the fatality of that rarer epidemic—was adding day by day to its list of preventable deaths; and other endemic diseases were co-operating with it, demonstrably, uninterruptedly, to decimate, impoverish, and abase the people. Whatever doubts might have existed as to a return of the foreign pestilence were soon solved; whatever hasty conclusions had been formed, as to its again remaining absent during half a generation, were soon disappointed and reversed. Even while I was addressing you on the subject, the plague had again kindled its smouldering fire, and was widening its circle of destruction. Perhaps from the eastern centres of its habitual dominion, from the alluvial swamps and malarious jungles of Asia, where it was first engendered amid miles of vaporous poison, and still broods over wasted nations as the agent of innumerable deaths, or perhaps from the congenial flats of Eastern Europe, where it may have lingered latent and acclimatised; the subtle ferment was spreading its new infection to all kindred soils. Repelled again from the dry and airy acclivities of the earth, and their hardier population, it filtered along the blending line of land and water—the shore, the river bank, and the marsh. Conducted by the Oder and Vistula from the swamps of Poland to the ports of the Baltic, it raged east and west, from St. Petersburg to Copenhagen, with frightful severity, and, obedient to old precedents, let us witness its arrival at Hamburg. Twice in the European history of cholera had this town seemed the immediate channel of epidemic communication to our island, the disease having on each occasion commenced in our north-eastern sea-ports within a very short time of its outburst there. A third time, not unexpectedly, has this dreadful guest, following the line of former visitation, touched upon the banks of the Tyne, where a worse than beastly condition of the crowded poor, and sewage water diluted through the people's drink, had prepared it an appropriate welcome (foot-note states that the condition mentioned was long prior to 1854). Next the disease was rumoured to be in London. Hope and belief are too near akin for this not to have been doubted and denied; but the last few weeks have shown, with sad incontrovertible certainty, that after only four years' absence, cholera has again obtained its footing on our soil. Six or seven hundred deaths, registered in the metropolis since the beginning of September, have already attested its presence. Anxiously adverting to the future, and asking what may be the onward progress of the disease, we can appeal only to a narrow experience. Before us lie the records of but two complete visitations of the disease and the commencement of this the third. It would be a shallow philosophy that should pretend from two observations to predict the possible orbit of this obscurely wandering plague. Yet I dare not disguise from you that such knowledge as we have, to justify scientific anticipation, is pregnant with threats and gloom. For let me remind you of the past. At each former period of attack, the infection, after a certain course over continental Europe, struck upon our eastern coast in the summer of an unforgotten year. In the northern parts of Great Britain so soon as it had lit among the population, each time it burst forth into explosive activity, and worked its full measure of destruction without delay. More faintly it reached the South. On each occasion, indeed, at the close of the summer, London was sensibly affected by the disease ; but we hoped under a milder infliction. Here and there, within its Bills of Mortality (as at Tooting in 1848) there was thrown some astounding flash on a particular hot-bed of co-operating poison ; but, on the whole, it seemed to the sanguine, on each occasion, that the fury of the epidemic was expending itself in our northern towns, and that the metropolis was to be comparatively spared. Each time, at the commencement of the new year, our London mortality from cholera seemed stationary within the limit of a few hundred deaths. Each time winter and spring allowed a long respite to our invaded city, and confirmed the omens of the hopeful. But each time there was disappointment. Each time as the warmth of the summer requickened the exterior conditions of chemical activity, the dormant fire kindled afresh, slowly at first, but with speedy acceleration of rate. Each time, in the few weeks before Michaelmas, amid almost universal threatenings of the disease, and amid such panic of death as the metropolis had not known since the Great Plague, there suddenly fell many thousands of the population.

" Thus, then, our position stands. Scientific prediction of phenomena can arise only in the knowledge of laws. That the phenomena of this disease, however capricious they may seem, are obedient to some absolute uniformity as yet beyond our ken—are enchained by that same rigid sequence of cause and effect which is imposed on all remaining Nature—it would be impossible to doubt. But these conditions are hitherto unknown to science. Hitherto we can speak of the facts alone with a short empirical knowledge of their succession. Yet in this light, such as it is, the conclusion is only too obvious. If the disease, already notorious for a tendency to return on its former vestiges repeat on this third occasion the steps of its two previous courses; or perhaps I should rather say, if it now proceed consistently to complete a repetition which it has already half affected, Asiatic cholera will be seriously epidemic in London in the third quarter of this year—will proceed with a stern unflattering test, to measure the degree in which these promises of sanitary improvement have been redeemed, which the error of its recent visitation extorted even from the supinest and most ignorant of its witnesses.

"In the face of so great danger, you will reasonably claim of your officer of health that he shall report to you how far the City is already fortified against this dreadful invasion, how far the hygienic defences of life, if weak, may be strengthened, how far there remain breaches now insusceptible of repair.

"Cholera is called a capricious disease, not for what it smites, but for what it spares; not because its ravages fall where the laws of Nature are observed, but because many neglects escape unscourged, or are punished rather in sample than in totality."

Filthy districts often escape the disease for long, but "it requires little education in the great harmonies of Nature to feel that in her empire there is not place for accident or caprice; that in the streams and eddies, the ebb and flow, of epidemic invasion, chance can no more prevail than in the planetary movements or the tides; and that whatever to our scanty knowledge seems exceptional or contradictory, must really mark some longer cadence in the rhythm of an invariable law"; whatever may be the causes of impurity, long arrears of it may "be cancelled in one dreadful blow, that wakes the unguarded district, as with some bursting storm, and leaves half its population mourners."

Cholera, like typhoid fever, is largely conveyed by means of impure drinking water. What was only shrewdly surmised by Dr. Snow after the first cholera epidemic soon came into the region of absolute certainty. It will be interesting to quote Dr. Thorne Thorne on the subject. He says: "Dr. Snow was amongst the earliest contributors to the etiology of cholera in this country. He had previously dealt with the epidemics of 1832 and 1849 in connection with the theory of water pollution. As regards the 1832 epidemic, he had maintained that its exceptional incidence, in certain localities, was in large part due to the polluted water in use in London, whether derived from wells liable to receive cesspool soakage or from the sewage-contaminated Thames. Between 1832 and 1849 cesspools had been largely abolished, but water-closets, the contents of which passed into the Thames, had replaced them, with the result of bringing about a state of river impurity far exceeding that of 1832. And during the 1849 epidemic the parts of the metropolis most heavily visited were those within the area of the Lambeth and the Southwark and Vauxhall Water Companies on the south side of the river, their supply being then the worst of all those derived from the Thames."

The "contamination of pump water" was also ascertained to have been associated with the spread of the disease. And now again, in 1854, Dr. Snow pointed to the proof which the incidence of cholera afforded "of the powerful influence which the drinking water containing the sewage of a town exerts over the spread of the cholera."

Between 1849 and 1854 important changes had taken place in the water-supply of the metropolis. The Lambeth Company has sought a supply higher up the river, and, to quote Mr. Simon, that company was now "furnishing as good a water as any distributed in London"; while its southern colleague, the Southwark and Vauxhall Company, "was purveying perhaps the filthiest stuff ever drunk by a civilised community." Here were materials for comparison, and the result was as follows: "On a population of 166,906 persons living in houses supplied by the Lambeth Company, the cholera deaths were at the rate of 37 to every 10,000 living; whereas, on 268,171 persons supplied by the Southwark and Vauxhall Company they were at the rate of 130 per 10,000. "The population drinking dirty water accordingly appears to have suffered three and a half times as much mortality as the population drinking other water."

It was during the epidemic that the circumstances occurred which have made the pump in Broad Street, Golden Square, historic in the annals of English cholera. According to Dr. Snow, 89 cholera deaths were registered in three sub-districts in the week ending September 2, 1854, 79 of these occuring in the last two days of that week, and "nearly all" in persons residing within a short distance of that pump. Indeed, "except among the persons who had been in the habit of drinking of the . . . . pump well," there had been no particular outbreak or increase of cholera in that part of London. It was a celebrated pump.

"The water was used for mixing with spirits in all the public-houses around. It was used likewise at dining-rooms and coffee-shops. . . . . It was also used at various little shops" in the making of sherbet. Amongst occasional consumers of it, living at a distance from the pump, numerous fatal attacks occured; whilst, on the other hand, the disease was markedly absent from several large groups of people living in the immediate neighbourhood, in institutions or other places having a different water supply." It was as a sequel to this epidemic that the need for a medical adviser to the State was recognised by the appointment of Mr. Simon (now Sir John Simon) as Medical Officer to the General Board of Health.

Polluted water also played an active part in spreading the disease in the cholera epidemic of 1866. Dr. Thorne Thorne says: "The story of this epidemic has been told in detail by the late Dr. Netten Radcliffe, who also, as the result of a laborious inquiry, came to the conclusion that the exceptional incidence of the disease in the eastern districts of London was the result of the distribution by the East London Water Company of a polluted water, which had 'in it a power of direct infectiveness for those who drank it.' During the course of 1866 the cholera deaths amounted to 14,378 in England as a whole; 5548 of these occurring in London." Dr. Thorne Thorne goes further on to say: "Since 1866, cholera, though more than once brought to our shores—as during the European epidemics of 1871–74 and 1884–87—has never succeeded in establishing itself in our midst, a result which is no doubt due to the steady removal from amongst the people of those insanitary conditions which are essential to its epidemic spread, and to the increasing security afforded by those measures of imperial and local sanitary administrations by which it is sought to diminish sickness and mortality from all preventable diseases, including cholera."

Dr. Thorne Thorne then alludes to the vexed subject of Quarantine. He says: "The beneficial results which have ensued in regard to the saving of life from cholera have, in no small measure, been due to the fortunate abandonment by this country of all endeavours to keep cholera away from her shores by a system of quarantine. I recently brought under the notice of the Epidemiological Society the attitudes we have finally adopted in this matter, in a record of the proceedings of the International Sanitary Conference of Rome, 1885, which I had the honour of attending as one of the delegates of Her Majesty's Government. It is one of distinct opposition to the entanglement of this country by means of a delusive system, offered anew under the plea that another reduction should be effected in the duration of a detention which, even under its most stringent forms, had been mainly characterised by ever-repeated failure, and I would now only refer to a summary of the grounds on which I justified this opposition. . . . . I concluded by observing that 'the system of quarantine has again and again shown itself to be impotent for good, and being so, its vexations and inhuman characteristics stand out the more prominently. Above all, it has a blighting effect upon sanitary progress. So long as Governments tell their peoples that a line shall be drawn around them across which disease shall not pass, so long will those peoples be reluctant to spend their money on the promotion of true measures of prevention. The quarantining countries are essentially those which cholera invades. Taken as a group they are those where true sanitary progress is at its lowest ebb, and, with the experience we have before us, I would, in conclusion, ask much in the words I used at the Roman Conference: Is it likely that this nation will sacrifice her well tried system of prevention for a restriction of five days' quarantine.' "

I will just allude to the terrible epidemic of cholera at Newcastle and Gateshead in 1853 partly to emphasise the exemption of Tynemouth and partly to show the great expense neglected sanitary reforms lead to sooner or later.

"In 1853 Newcastle and Gateshead," says Mr. Simon, "suffered the most terrible outbreak of cholera yet experienced in England, and lost within a few weeks nearly 2000 of their population. In the borough of Tynemouth, only eight miles below Newcastle, and connected with it by railway as well as by river, there occurred during that epidemic period only four fatal indigenous cases. This escape was not due to an entire non-participation in the epidemic influence; for diarrhœa was generally prevalent in Tynemouth while cholera was in Newcastle. Nor did it depend on the absence of opportunities for contagion; for many thousand persons from Newcastle and Gateshead fled to Tynemouth, and many continued to pass daily between the towns during the whole time of the visitation. The remarkable immunity of Tynemouth is the more remarkable from its contrast with the heavy mortality experienced during the epidemic of 1848–9, when the deaths in the parish from cholera and diarrhœa amounted to 463. The great difference between these results seems to have been entirely due to sanitary improvements effected in Tynemouth during the interval between the two visitations."

Under Dr. Greenhow's active chairmanship every precaution was taken in the autumn of 1852 in view of the reappearance of the cholera, the entire expense amounted to £330, which was afterwards reduced to £200 by the sale of manure, 1500 cartloads of which had been removed from the vicinity of human habitations. Compare the expense of sanitary precautions with the *laissez-faire* policy. "The contingent expenses for the maintenance of widows and orphans whose claims arose out of that four months' visitation, appear to have amounted within the next four years to £7500. The cost (direct and indirect) of the epidemic at Newcastle and Gateshead was estimated at about £40,000, over and above the large losses sustained from the temporary stoppage of the trade."

Before leaving this subject I would refer to the personal precaution against cholera advised by Mr. Simon: "In the probable anticipation that cholera will next year (1854) prevail in London with at least its former severity, it may be claimed of my office that I should say something with respect to personal precautions for avoidance of the disease. While most willing to place at your disposal any useful results of my practical experience in the matter, I cannot but feel the great difficulty of making general suggestions in a form really capable of particular application. From the eminently local prevalence of the poison, it may be inferred that, for all whose circumstances allow an option in the matter, the first and most important precaution would consist in avoiding those localities where the epidemic is active. Our knowledge of the subject enables us confidently to say that, if in one spot the chance of being attacked by cholera is as 1 to 100, in another it becomes 1 to 50, in a third 1 to 5, in a fourth almost an equal chance whether to be attacked or not. Nothing is gained towards security by the mere act of leaving our metropolitan area, if one resorts to some other place where the system of drainage is equally vicious, or where, as at our nearest bathing-place, the beach is made almost as offensive by sewage as here the river-banks. . . . . This unavoidable result of proclaiming the laws of the disease I most regret in regard of its personal bearings. But the facts of the case are all important for the public; and sanitary improvements will perhaps move more quickly in the country when it is known that the pecuniary prosperity of places may suffer from their reputation for endemic disease. For persons whose circumstances or duties retain them unavoidably in the midst of these suffering districts where the poison is most active, the best counsel I can offer—even if at first hearing it seem vague—is, that they should be vigilant as to preserving the greatest possible soundness and vigour of general health; keeping the body, so far as may be, undisturbed by extremes of heat and cold, undepressed by long confinement, unfluttered by violent passions, unexhausted by physical and mental fatigue, untried by any excess or any privation; taking for diet a sufficiency of fit and nutritive food, rather in generous measure than otherwise, but not exceeding the confines of temperance, and giving meanwhile a prompt attention and cure to whatever accidental ailments may arise."

Mr. Simon then goes on to say that in London at least tonics are often required for their re-establishing effect, for with epidemic poisons generally, and in a marked degree with Asiatic cholera, it seems that all states of languor, depression, and debility enhance the risk of infection. "Beyond these general cautions there is yet one which requires very particular mention. In respect of the commencement and predispositions of the disease, it is now well known—first, that in this country it habitually begins with diarrhœa of a painless and apparently trivial character; secondly that diarrhœa, however produced, is, of all known personal conditions, the one most likely to invite an attack of cholera at times when that disease is epidemic; thirdly, that during the prevalence of cholera, side by side with it in a district, there is always a vast amount of epidemic diarrhœa, apparently constituting slighter degrees or earlier stages of the same disease; that this condition is just as amenable to treatment as the confirmed collapse of cholera is utterly the opposite; and—since we can never say how incurable a few hours may render this insidious symptom—that its immediate arrest is a matter of vital importance."

Precautions against causing diarrhœa to oneself by errors of diet will vary somewhat with different individuals. Every person of ordinary discretion knows the habits of his own body, and can be tolerably confident, within certain limits of food, that he gives himself no occasion of sickness. He remembers articles of diet, which his neighbour perhaps may innocently indulge in, but which to himself are the occasion of inward disorder, of purging or vomiting, "bilious attack" or nettle-rash, headache, nightmare, or some other inconvenience. This knowledge fixes the limit which it primarily behoves him to regard, taking such food only into his body as experience has shown best to agree with it; and adhering to this course, without panic as to particular accustomed articles, and without abrupt discontinuance of old harmless habits. Apart from personal peculiarities, the chief dangers of diet appear to lie as follows: first, in those excesses of meat and drink, which (especially under circumstances of fatigue) occasion sickness to the stomach, or an increased labour of digestion ; secondly, in taking food, solid or fluid, which is midway in some process of chemical transition, half fermented beer and wine, water containing organic matters, meat and game and venison no longer fresh, and not completely cooked, fish and shellfish, in any state but the most perfect freshness, fruit or vegetables long gathered or badly kept, and the like; thirdly, in a profusion of cold sour drink; fourthly, in partaking largely of those articles of diet which habitually, or by reason of imperfect cooking, pass unchanged through the intestinal canal; and fifthly, in the indiscreet use of purgative medicines, or in taking any article of diet which is likely to produce the same effect. In short, if care be taken under all these heads to avoid occasions of intestinal disturbance; if the diet, while generous be simple and strictly temperate; if regular hours be given to sleep, to meals, to industry, to recreation, if a fair proportion of outdoor exercise be taken, if damp and extremes of temperature be guarded against and all practical pains be given to avoid the sources of bodily and mental depression, the danger will certainly be reduced to its minimum, and whatever effects the epidemic may happen to produce can be readily recognised and boldly encountered. Should these effects arise in their customary form of diarrhœa, it is of absolute urgent necessity that immediate medical treatment be resorted to, and so important for the safety of life is the recognition of this symptom in the earliest stage of its occurrence, that no unwonted action of the bowels should pass unobserved. The public constantly asks to be informed of some drug or combination of drugs, to which, under these circumstances, they may have immediate recourse. But, after very careful consideration of this subject, after hearing arguments on both sides, and reading those prescriptions which have been recommended for adoption, I venture to express my opinion that the safest course for the public, in regard of this threatened disease, will be to follow the same principle as guides them in their ordinary seizures of illness, and to obtain as quickly as possible the aid of their customary medical advisers. There is an invincible aptitude in the public to misapply all precautionary medicines within their reach ; often superstitiously to treat them as charms, under the protection of which they may neglect temperance of diet and all other solicitude for health ; often ignorantly to employ them in cases for which their use is forbidden ; often, at the instigation of panic, to abuse them by preposterous and hurtful excess. Nervous and uneducated persons, instead of employing their astringent dose simply to stop any undue action from the bowels, would be apt, as the danger neared them, to make it an habitual dram in order to anticipate any such action, and the frequent after necessity for purgative medicine, thus created, would constitute the very danger they desire to avoid. Recognising therefore, at its full value, the importance of immediately treating, in every case, the first phenomena of epidemic diarrhœa, I must yet doubt whether the conditions of medical science and general education are such as to justify the promulgation of general formulæ so liable to extensive abuse."

TUBERCULOSIS.

Tuberculosis is an infectious disease which owes its origin to a specific organism called a bacillus—the tubercle bacillus. This tubercle bacillus is the probable cause of all tubercular processes, and to its presence the essential characteristics of tubercle are due ; the bacilli are very small, rod-shaped germs, they are easily destroyed by chemical means, but their spores are much more hardy. Tuberculosis usually affects the lungs, causing pulmonary tuberculosis or phthisis, but all parts of the body are liable to be the seats of it.

Phthisis alone is said to cause 80,000 deaths in the United Kingdom every year. If the bacillus had the power of infecting every lung that it entered, no one would probably escape; but fortunately something more than introduction of the poison is necessary for the production of the disease.

A very large number of people inherit a tendency to phthisis; this inherent condition it is which must be regarded as constituting a soil favourable to the development of the inspired bacillus. There is no doubt, however, that people who abuse or trifle with their constitutions, or who are placed under very unfavourable conditions generally, may become consumptive without any hereditary tendency. Tuberculosis can also be acquired by inoculation; this is rare, and usually gives rise to a local not a general disease. Local inoculation, however, gives rise to acute tuberculosis in some animals. In man, acute general tuberculosis results from the bacilli of a caseous gland or deposit obtaining entrance into the circulation. Inhalation is by far the most common source of infection. The bacilli are frequently swallowed, and doubtless, in the majority of cases, with little bad result; but there is evidence to prove that phthisis may be introduced into the system by cow's milk and butcher's meat, the lower animals being very subject to tubercular diseases. All danger of milk conveying the disease may be obviated by boiling it; but cooking does not always destroy all the bacilli in meat. It is an open question whether the flesh of an animal should be condemned in which the lungs alone show slight evidence of tubercle.

Among the predisposing causes of phthisis, dampness of soil is a well-known one, having been proved to demonstration over and over again.

Phthisis, too, is largely induced by overcrowding. Years ago our prisons, barracks and workhouses afforded most undeniable proof of this statement. Bearing upon the above is the fact that the bacilli and their spores are found in enormous quantities in the dust of rooms inhabited by consumptive people. Bollenger has stated that the daily expectoration of a single patient may contain 20,000,000 bacilli, and that drying for months will not destroy their virulence.

Direct infection, however, from person to person has rarely been proved with any certainty. A further predisposing cause exists in the carrying on of certain trades in which the air is charged with mineral or organic dust in the form of sharp angular particles. These trades are responsible for a large number of deaths from phthisis, the lungs are injured by the particles of dust, and being injured invite bacilli to take up their abode in them, an invitation which statistics show is only too readily accepted.

At one time it was believed that tuberculosis almost invariably ended fatally; but examination of bodies after death shows that many cases are cured possibly in as large a proportion as 25 to 50 per cent.

To Dr. Koch we are indebted for the discovery of the bacillus, which alone is a very strong claim to public regard, seeing the revolution which that discovery has accomplished in preventive and general treatment; the bacillus was discovered by Koch in 1882. More than a year ago it was hoped that at last a remedy had been found able to cope successfully with this disease, and the eyes of the whole civilised world, and especially those of innumerable consumptive patients, were turned in eager expectation to Koch in the hope that the discoverer of the bane had also discovered the antidote; but, alas! it was not to be; a fair and extended trial of the supposed remedy (tuberculin) was made in Germany and in other countries, and finally given up as not only useless but positively dangerous. It is not improbable that it may yet be permitted to Koch to crown his great discovery with a still greater.

The bacilli are destroyed by boiling, and by solutions of perchloride of mercury and carbolic acid; they, however, resist the action of fairly strong solutions of these agents for some minutes.

It is obvious that phthisis is preferably to be treated by preventive measures rather than by endeavouring to cure the disease when the bacillus has obtained a firm foothold in the lungs or other parts of the body. The checking of overcrowding, the drying of the soil, and the supervision of unhealthy occupations, rest with the sanitary authorities, and have received much attention. The marriage of consumptive people is greatly to be deprecated, amounting in some cases almost to a crime; to bring beings into the world who are morally certain to be affected with this miserable wasting disease is most reprehensible.

I will conclude this interesting subject, and one which I have only just touched upon, by quoting, with his kind permission, the following from a letter by Dr. Broadbent, at whose suggestion I have included tuberculosis in my book: "Although not communicable directly from person to person, there is now, I think, no doubt that the bacillus is conveyed by sputum (that which is expectorated) which dries, and is carried about and inhaled in the form of powder and dust. One may say that phthisis is caught indoors; Ransome of Manchester has shown that it clings to houses. Destruction of all sputa, free ventilation, especially of bedrooms, disinfection of rooms in which a case of phthisis has lived and died, would do much to prevent this disease."

WELLCOME LIBRARY INSTITUTE

APPENDIX.

Infectious Diseases (Notification) Act, 1890.

As frequent reference has been made in the body of the work to this Law, it is advisable to state one or two of its most important provisions.

"Every *medical practitioner* attending on or called in to visit the patient shall forthwith, on becoming aware that the patient is suffering from an infectious disease to which this Act applies, send to the medical officer of health for the district a certificate stating the name of the patient, the situation of the building, and the infectious disease from which, in the opinion of such medical practitioner, the patient is suffering," and further that

"The *head of the family* to which such patient belongs, and in his default the nearest relatives of the patient present in the building, or being in attendance on the patient, and in default of such relatives, every person in charge of or in attendance on the patient, and in default of any such person, the occupier of the building, shall, as soon as he becomes aware that the patient is suffering from an infectious disease to which this Act applies, send notice thereof to the medical officer of health for the district."

"In this Act the expression 'infectious disease to which this Act applies,' means any of the following diseases—namely, small-pox, cholera, diphtheria, membranous croup, erysipelas, the disease known as scarlatina, or scarlet fever, and the fevers known by any of the following names, typhus, typhoid, enteric, relapsing, continued, or puerperal, and includes, as respects any particular district, any infectious disease to which this Act has been applied by the Local Authority of the district in manner provided by this Act."

The penalty for default is a fine not exceeding forty shillings.

PRINTED BY BALLANTYNE, HANSON AND CO.
LONDON AND EDINBURGH

71